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REPORT

OF THE

DIRECTOR OF THE MINT

UPON THE

STATISTICS OF THE PRODUCTION

OF THE

PRECIOUS METALS

IN THE

UNITED STATES.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1883.

ANNUAL PRODUCTION OF PRECIOUS METALS IN THE UNITED STATES.

Treasury Department,
Document No. 441.
Bureau of the Mint.

LETTER

FROM

THE SECRETARY OF THE TREASURY,

TRANSMITTING

The report of the Director of the Mint upon the statistics of the production of precious metals for the year 1882.

February 21, 1883.—Referred to the Committee on Mines and Mining and ordered to be printed.

Treasury Department,
Office of the Secretary,
Washington, D. C., February 21, 1883.

Sir: I have the honor to transmit herewith the report of the Director of the Mint upon the statistics of the production of the precious metals in the United States for the calendar year 1882.

Very respectfully,

H. F. FRENCH,
Acting Secretary.

Hon. J. Warren Keifer,
Speaker of the House of Representatives.

LETTER OF TRANSMITTAL.

TREASURY DEPARTMENT,
BUREAU OF THE MINT,
Washington, D. C., February 21, 1883.

SIR: I have the honor to submit herewith my report upon the production of the precious metals in the United States for the calendar year 1882.

The information submitted in this report has been obtained in part from the records of the mints and assay offices, which show the amount of domestic gold and silver deposited at those institutions, and the locality of production of unrefined bullion, also from correspondence and reports furnished by owners, managers, and superintendents of mines as to the amounts produced by the mines under their charge and from bankers and dealers in bullion as to the amounts forwarded by them respectively, and from smelting and refining works, giving the amounts respectively treated by them and the localities from which the ore or bullion was received. Mining regions have been personally visited and much information has been obtained in this manner as well as by reports and correspondence from gentlemen engaged or interested in mining, and valuable material has been obtained and compiled in my office, from the local papers in mining regions and journals in other localities.

In the collection of the statistics I have received much information and valuable assistance from gentlemen to whom credit is given in the detailed report upon districts and mines. I have also to acknowledge the courtesy and hearty co-operation of bullion dealers, bankers, and the superintendents and officers of mines, mills, smelters, and refiners, and of the officers and agents of express and railroad companies, whose statements have enabled me to trace domestic bullion from the mints and ports of export back to the States, Territories, and localities where it was originally mined.

The supervision of the office work relating to the collection of these statistics was assigned as heretofore to Dr. Frederick Eckfeldt, and I am indebted to him and to the other clerks in my office for their ready co-operation and aid in classifying, condensing, and tabulating the voluminous material accumulated during the year, and for valuable assistance in the preparation of this report.

To harmonize conflicting statements and make proper allowances in some cases, for deficient returns and in others for exaggerated statements, has not been without difficulty, but the amounts stated to have been produced by the mines of the several States and Territories, as well as the total production, are approximately correct.

Very respectfully,

HORATIO C. BURCHARD,
Director.

HON. CHARLES J. FOLGER,
Secretary of the Treasury.

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PART I.

PRODUCTION OF STATES AND TERRITORIES.

PRODUCTION OF STATES AND TERRITORIES.

The mines of the United States in the calendar year 1882 produced nearly two and a fourth million dollars less in gold and over three and three-fourths millions more in silver than in the previous year. The comparative decline in the production of gold was greater in the State of California than in any other State or Territory, and resulted partly from a diminished yield, but more especially from the interruption of hydraulic mining in some of the counties which heretofore have been the largest producers in the State.

The history of gold mining in the United States will doubtless be similar to that of the countries of the Old World. Gold is usually first discovered in the placers and valleys where it has been deposited by the slackened currents of swift streams, which have washed and carried it down from the hills and mountains containing mineral veins. The yield at first is abundant, but the amount obtained by excavating and washing placer beds diminishes from year to year, so that eventually the sources of supply for the precious metals are found in the rocks where they were originally deposited. The mines of California, which in 1850 furnished the world with sixty millions in gold, in 1882, by a greater actual expenditure of labor and capital, only yielded seventeen millions. The diminution in the gold product of that State in the last, compared with the previous year, has resulted from the diminished yield not only of the placer and hydraulic mines in the northern and central portion of the State, but also of the quartz mines in the southern and southeastern counties. The gold obtained from the Bodie mines in 1882 was nearly one million less than in 1881.

The mines of Oregon, which consist principally of placers, seem also to be declining, and furnish nearly one-fourth of a million less than in the previous year. The gold mines of Idaho have produced $200,000 less gold than they did in 1881, while Dakota is $700,000 short.

In silver production the largest gain has been in New Mexico, where very rich mines were opened during the year and added nearly two millions of silver bullion to the product of the country.

Utah furnishes $400,000 more than in the previous year, Idaho $700,000, and Montana $1,700,000, while Arizona has maintained its former large production.

The total production of the States and Territories during the year 1882 is estimated to be approximately $79,300,000, of which $32,500,000 is gold and $46,800,000 silver.

From a comparison of all the data received at this office the following table is given showing the approximate amounts produced by each State and Territory:

State or Territory.	Gold.	Silver.	Total.
Alaska	$150,000	....	$150,000
Arizona	1,065,000	$7,500,000	8,565,000
California	16,800,000	845,000	17,645,000
Colorado	3,360,000	16,500,000	19,860,000

State or Territory.	Gold.	Silver.	Total.
Dakota	$3,300,000	$175,000	$3,475,000
Georgia	250,000	....	250,000
Idaho	1,500,000	2,000,000	3,500,000
Montana	2,550,000	4,370,000	6,920,000
Nevada	2,000,000	6,750,000	8,750,000
New Mexico	150,000	1,800,000	1,950,000
North Carolina	190,000	25,000	215,000
Oregon	830,000	35,000	865,000
South Carolina	25,000	....	25,000
Utah	190,000	6,800,000	6,990,000
Virginia	15,000	....	15,000
Washington Territory	120,000	....	120,000
Wyoming	5,000	....	5,000
Total	32,500,000	46,800,000	79,300,000

Of the total amount of bullion deposited at the mints and assay offices of the United States $31,378,248 of gold and $31,400,792 of silver were represented to be of domestic production. Of the amount of fine gold deposited as domestic bullion at the San Francisco Mint it has been ascertained that $413,290 had been imported, leaving $30,964,958 known to have been produced by the mines of the United States.

Exporters of silver bullion reported $175,000 of gold to have been contained in silver bullion exported by them.

In my last report I estimated that in 1881 seven millions of domestic gold were used in the arts and manufactures, and fully as large an amount was consumed for like purposes in 1882.

Of this amount the mints and assay offices furnished $5,600,000, and the remainder, $1,400,000, was supplied by the refineries on the Atlantic and Pacific seaboards, or was used in the form of native gold.

These amounts represent closely the total production of the country, recapitulated as follows:

Deposited at mints and assay offices	$30,964,958
Exported in silver bullion	175,000
Furnished by refineries to manufacturers	1,400,000
Total	32,539,958

The reported exports of domestic silver bullion at their coining value amounted to $13,250,000. The amount of domestic bullion deposited at the New York assay office and returned in bars for manufacturers' use was $5,744,251. The Philadelphia Mint furnished for a like purpose about $250,000, and the amount furnished by private refineries in the country was probably $350,000. In the year's coinage the amount of domestic bullion purchased and consumed was $24,700,000.

These amounts in detail aggregate as follows:

Exported	$13,250,000
Furnished to manufacturers by New York assay office	5,744,251
Furnished to manufacturers by Philadelphia Mint	250,000
Furnished to manufacturers by private refineries	350,000
Used in coinage	24,700,000
Total	44,294,251

There has been a greater decline in the amount deposited at the mints and assay offices and credited as domestic gold bullion during the year than the difference between the gold production of the mines in 1881 and 1882, but I have reason to believe that a greater amount of gold was used in manufactures and the arts, and was supplied not only by an increased consumption of bars manufactured at the New York assay office, but of those prepared by the private refineries, as well as of native gold in grains, &c.

Less gold bullion is also reported to have been carried by express as well as deposited in the mints. The deposits and purchases of silver bullion entered as domestic production in the last year exceeded the amount received in the previous year by $3,501,580, which corresponds very nearly to the increased production given in my estimate.

The amount of gold and silver refined and parted at the mints and New York assay office shows a corresponding increase in the production of silver and diminution in gold.

In 1882, 1,126,514.673 ounces of gold, of the value of $20,958,412.52, were parted and refined, while in 1881 the amount was 1,234,406.154, of the value of $22,965,695.86, showing a decrease of $2,007,263.34. In 1881 the amount of silver parted and refined was 9,945,990.49 ounces, worth at its coining value $11,573,411.47, and in 1882, 11,917,661.45 ounces, of the value of $13,867,824.23, an increase of $2,294,412.76.

The production, coinage, movement, and consumption of bullion and coin in the United States during the year have resulted in a gain in the production over the consumption of domestic gold bullion, as estimated, of $25,500,000, and in the import over the exports of gold bullion and foreign gold coin of $477,953, a total of $25,977,953. In gold coin the gain to the circulation by coinage was $65,478,537, and the loss by the excess of exports over imports of United States gold coin was $25,796,504, leaving a net gain to the circulation of gold coin of $39,682,033, although the net excess in gold of production and import over exports and consumption was $180,449.

In silver the gain to the circulation was by coinage less recoinage, $27,384,506. The imports of American silver coin were $629,878, and the exports $405,015, gaining $224,863, which, added to the net coinage, makes the total gain in silver coin during the year $27,609,369.

Mining operations have been attended with the usual vicissitudes during the year. In some localities and in some mines the discovery of large and rich deposits of ore have remunerated the owners for many years of privation and labor, and often brought fortunes and affluence to many poor and persevering miners and prospectors, while on the other hand the stores of precious metals in other mines seem to have become exhausted, and increasing expenses or incompetent management have transferred dividend-paying mines to the list of non-producers or levied assessments upon instead of paying money to stockholders.

A comparison of the dividends of the incorporated companies in 1882 with those in 1881 shows a slight falling off. It is impossible to state the total dividends paid or the profits realized from all the gold and silver mines of the United States. Last year the dividends paid by incorporated gold and silver mining companies were as follows:

States and Territories.	Mines.	Amount.
Arizona	5	$1, 887, 500
Colorado	16	2, 326, 650
California	10	1, 312, 047
Dakota	3	1, 110, 000
Montana	3	221, 516
Nevada	7	663, 262
Utah	4	2, 129, 000
Idaho	3	38, 000
Georgia	1	48, 000
New Mexico	2	204, 000
Total	....	9, 939, 975

Fifty-four corporations engaged in mining gold and silver have reported the payment of $9,940,000 in 290 dividends. But it must not be inferred that these mines represent the total profits in mining. Hundreds, perhaps thousands, of mines owned by private parties as well as corporations yield handsome profits to their owners, who publish no notices of their mines or mining operations. The number of persons engaged in mining in the States and Territories producing gold and silver was reported as follows:

Arizona	4,678
California	37,147
Colorado	28,970
Dakota	3,570
Idaho	4,708
Montana	4,813
Nevada	6,647
New Mexico	1,496
Oregon	3,696
South Carolina	114
Wyoming	328
Utah	2,592

The total number engaged in mining in the States and Territories west of the one hundredth meridian is less than 100,000; and in many of these States mines of iron, copper, and lead, as well as the precious metals, are largely worked.

The total production of the year makes an average of nearly $1,000 for every miner employed in this industry. But, while the mines on the whole seem to have been remunerative and to have paid in many cases satisfactory dividends, in others large amounts have been called for by frequent assessments. A list of mining companies who have made assessments upon their stockholders for funds to carry on operations or pay for previous expenditures has been prepared and is published in the appendix to this report.

One hundred and seventy-five companies have made three hundred and forty-three calls for funds; seventy-six of them have asked their stockholders to advance $7,087,000. The amount required by the remaining companies has not been ascertained, but if in proportion to the others, the sum would be over $9,000,000.

A general review of the mines and mining industry of the several States and Territories is embraced in the following chapters.

CHAPTER I.

CALIFORNIA.

This State has maintained the second place in the list of gold and silver producing States and Territories. There was, however, a diminution in the yield of the precious metals of about $1,300,000 from the production of 1881.

This was largely due to a falling off of upwards of $900,000 in the production of the Standard Consolidated mine at Bodie. The gravel mines, too, yielded less, as they had not recovered from the depressing effects of litigation on the débris question, which at one time threatened not only to cripple the operations of some of the chief producing mines, but in some instances to cause a total suspension.

In sections of country where suits were pending capital was withheld from engaging in new mining enterprises, and even the quartz mines were affected to some extent.

In the southern part of the State more activity was manifested than for some years past; old mines were reopened and prospecting systematically conducted, with the result of discoveries of importance being made.

During the year the following dividends were paid by California companies:

Companies.	Dividends.	Amounts.
Black Bear Quartz	4	$31, 500
Bodie Consolidated	4	100, 000
Bulwer Consolidated	12	120, 000
Fresno Enterprise	1	10, 000
Great Western Quicksilver	1	12, 500
Idaho	12	224, 750
Marguerite	1	6, 250
Napa Consolidated Quicksilver	9	90, 000
New York Hill	2	20, 000
Pleasant Valley	6	30, 000
Plumas-Eureka	2	50, 800
San Francisco Copper	6	15, 000
Sierra Buttes	2	14, 100
Standard Consolidated	13	725, 000
Totals	75	1, 449, 900

This is nearly $400,000 less than was paid in 72 dividends in 1881.

Sixty-eight mines in fourteen counties are reported to have levied one hundred and twenty-one assessments and called upon the stockholders for $1,547,467, as against $2,237,850 in 1881.

I have estimated the total production of the State at $17,645,000, of which $16,800,000 is gold and $845,000 silver. This was produced by the several counties approximately as follows:

Counties.	Gold.	Silver.	Total.
Alpine	$20, 000	$10, 000	$30, 000
Amador	1, 500, 000	....	1, 500, 000
Butte	650, 000	....	650, 000
Calaveras	670, 000	....	670, 000
Colusa	3, 000	....	3, 000
Del Norte	80, 000	....	80, 000
El Dorado	600, 000	....	600, 000
Fresno	80, 000	....	80, 000
Humboldt	100, 000	....	100, 000
Inyo	220, 000	130, 000	350, 000
Kern	260, 000	20, 000	280, 000
Lassen	100, 000	20, 000	120, 000
Los Angeles	17, 000	24, 000	41, 000
Mariposa	250, 000	4, 000	254, 000
Merced	10, 000	....	10, 000
Mono	2, 200, 000	380, 000	2, 580, 000
Nevada	3, 500, 000	10, 000	3, 510, 000
Placer	800, 000	....	800, 000
Plumas	1, 250, 000	....	1, 250, 000
Sacramento	400, 000	....	400, 000
San Bernardino	20, 000	150, 000	170, 000
San Diego	100, 000	....	100, 000
San Luis Obispo	5, 000	....	5, 000
Shasta	300, 000	80, 000	380, 000
Sierra	1, 100, 000	....	1, 100, 000
Siskiyou	720, 000	....	720, 000
Stanislaus	80, 000	15, 000	95, 000
Tehama	10, 000	....	10, 000
Trinity	600, 000	....	600, 000
Tulare	5, 000	2, 000	7, 000
Tuolumne	400, 000	....	400, 000
Yuba	750, 000	....	750, 000
Total	16, 800, 000	845, 000	17, 645, 000

This estimate of the gold product of California in 1882 is nearly $1,500,000 higher than the estimate of statisticians on the Pacific coast; but after a careful revision of the reports from mines and districts and of the statements of the amount and sources of the gold received at the San Francisco and Carson mints, I am constrained to adhere to the figures I have given.

The value of the gold coined at these mints during the year was $29,929,525, of which $2,441,956 was gold bullion belonging to the Government in those mints at the beginning of the year in excess of the amount at its close, leaving $27,487,559 coined from bullion deposited during the year.

Of the latter, $26,431 was United States gold coin, old plate, jewelry, &c., and $4,504,004 foreign gold coin and bullion. Assuming that all of the foreign gold coin and bullion imported during the year at San Francisco, amounting to $4,748,766, came to the mints and was also made into coin, there would remain $22,712,306 gold of domestic production used in the coinage, which must have been deposited at the San Francisco and the Carson mints from the States and Territories sending their bullion to these mints. From the mint records and the reports from private refiners, it appears that all of the domestic bullion received at San Francisco and Carson, except $81,776, came from the Pacific States and Territories, *i. e.*, California, Nevada, Oregon, Alaska, Arizona, Idaho, and Washington, and that these States and Territories sent to the Atlantic coast, also, gold bullion to the amount of $612,524. It is evident, therefore, that the production of the Pacific States and Territories should equal the gold bullion used in coinage that must have been received from them, $22,630,540, and the amount they sent to the Atlantic seaboard, $612,524, a total of $23,243,064. Their total production as estimated in the general table is placed at $22,570,000, showing, if the official records are to be relied upon, that more than one-half million dollars of gold bullion was delivered at San Francisco and Carson from the Territories bordering upon the Pacific States and Territories; or that the total production of the latter during the year must have been greater rather than less than the amount I have credited to them.

The following review of the mines of California was prepared, under the direction of Mr. E. F. Burton, superintendent of the mint at San Francisco, by Mr. J. R. Hardenbergh, of the same institution, whose long residence in California and familiarity with mining matters add much value to his statements and conclusions:

ALPINE COUNTY

Borders on the State of Nevada. It lies on the summit and eastern slope of the Sierra Nevada Mountains; it is very rugged and mountainous, and is sparsely settled.

The mining interests of Alpine County still remain to a great extent neglected by capitalists, although the showing is of the very best. The mines have been discovered a number of years, and the facilities for reaching them from the centers of population are of the best; the climate cannot be excelled, a great abundance of wood and water—all these facilities for working our mines cheaply and profitably, seem rather to deter mining men from coming here, and instead seek investments in more inaccessible and disadvantageous regions.

The Stella mine, formerly known as the Morning Star, situated about six miles east of Markleville in *Mogul* mining district, owned by the Isabella Mining Company, of London, and under the management of Lewis Chalmers, esq., whose address is Silver Creek, Alpine County, California, came into the present owners' hands in August, 1881, and until lately has been worked in only a tentative way until the company should ascertain whether the ore could be successfully worked by the Hunt, Douglass and Stewart process. The ore is a highly sulphureted combination of gold, silver, and copper, the copper being in the form of enargite, and while in the hands of the original owners defied the usual modes of treatment; accordingly, the appliances for that process were added to the Exchequer mill, to the extent, it was believed, of 10 tons a day, but it turned out in actual working only 3½ tons.

The mill started in January, 1882, and ran for six months and sixteen days (capacity three and a half tons per day), when it was shut down to extend the milling capacity. The battery samples run from $40 to $60 per ton in gold and silver, and 8 to 10 per cent. in copper. The gross bullion out-turn during that period was $18,172 in gold and silver, and 70,895 pounds of cement copper. The whole of the ore heretofore milled came from above the tunnel level only 150 feet from the surface. The company have almost finished the erection of hoisting works good for 1,000 feet, and have already sunk 188 feet of a vertical shaft. The capacity of the mill has been increased to 10 tons per day, and will be increased to 20 tons per day in the spring. The mill has 18 stamps, is run by steam, and crushed a little more than a ton to the stamp, and will soon recommence crushing ore. There are 22 men employed at present in and about the mine, and 18 men in and about the mill. This mine promises large and continuous returns in the future. The Isabella tunnel has been idle since it was closed December 10, 1880.

The prominent mines it is intended to open are the Exchequer and I. X. L., which have been prospected to a depth each of 400 feet by shafts, and very rich ore extracted in small quantities, specimens having been assayed above $5,000 per ton from the Exchequer and over $1,000 from the I. X. L. The Exchequer has an 18-stamp mill at Silver Creek and the I. X. L. a 20-stamp, both first class. Work in the Isabella tunnel will doubtless be resumed during the coming year, as the known value of the mines which the tunnel will strike has been ascertained beyond doubt.

The Orion mine is situated in Mogul mining district, adjoins the Stella mine, and consists of three locations of 1,500 feet in length and 600 feet in width each. The improvements consist of one vertical shaft 110 feet deep—size, 4 by 8 feet in the clear, with center compartment; one tunnel into the mountain, the level of which is the top of the shaft, 200 feet in length, and a tunnel now being run from the base of the mountain is in a distance of 550 feet. A ledge was cut in this tunnel, at a distance of 200 feet from the mouth of the tunnel, 20 feet wide; hard quartz, carrying 10 per cent. copper, $15 per ton silver, and $5 per ton gold. At 300 feet from the mouth of the tunnel a ledge 6 feet wide was cut, assaying $212 in silver, and $25 in gold, and 50 per cent. lead. The development of this mine constantly progresses, and promises the most flattering results. The mine has been worked eight months, and at present employs seven men. The office of the company is in Stockton, Cal. P. Curtis is the superintendent, whose post-office address is Monitor, Cal. The company has no reduction-works.

The Colorado No. 2 Gold and Silver Mining Company's claim at Monitor is not in operation at present, owing to financial difficulties caused by an excess of expenditures in improvements over returns from the mine, but negotiations are now pending whereby it is believed a sale will be effected and this valuable mine again started up. The mine has two tunnels run into the Colorado Mountain, known as the upper and lower. The upper is 500 feet in length to the ledge, and the lower is 1,400 feet long, and is 325 feet deeper than the upper. The two are connected by a winze at the point of intersection with the ledge 1,000 feet in lower and 500 feet in the upper. There are two drifts running from winze, one 112 feet above the lower tunnel, 400 feet in length, and one 100 feet; about 120 feet long. A large body of pay ore is opened on all the levels. Depth from surface to lower tunnel 600 feet. Six hundred and twenty-five thousand dollars have been extracted from this mine, although it is but in its infancy of development. The company's mill is a large 20-stamp, 100 horse-power engine, two boilers, six Frue concentrators, one large two-hearth reverberatory roasting furnace, one small roasting furnace, the necessary tanks, &c. The cost of mining and milling ore does not exceed $5 per ton. The average value of the ore is $12 per ton. The mill has a capacity of reducing 2½ tons per stamp in twenty-four hours. P. Curtis is superintendent of this mine.

The Advance mine is located at Monitor and adjoins the Colorado No. 2 on the southwest. This mine is not being worked at present, but the owners soon expect to be able to resume. The company has a shaft 300 feet deep below Monitor Creek, with various and extensive drifts and cross-cuts, steam hoisting works, and water-power. The mill of fifteen stamps is on the East Carson River, some 3 miles distant from its mine, which is doubtless a valuable property when properly worked.

The Altura mine is situated in Hope Valley, about 12 miles east of

Markleville and 5 miles north of Government signal station known as Round Top. The claim is 3,000 feet in length and 600 feet in width. The lode has a width of 300 feet at the main chimney of ore. This chimney rises some 75 feet higher than the wall rock. An open cut is run from the westerly wall, 75 feet long to a height of 50 feet at the inner end, from which point a shaft is sunk 160 feet deep. There are four drifts from the bottom of this shaft. The cross-cut drift west is 60 feet long and east 35 feet, and the wall has not been reached. Different strata of rock run through this immense chimney, carrying various kinds of metals. One vein is rich in copper. Some 70 tons gave an average of 34 per cent. and $31 in silver per ton. Several tons of rock from another stratum milled $22 in silver and $11 in gold. Nickel is also found in this chimney. A number of other shafts and improvements are on the lode, including steam hoisting-works, boarding-house, &c. A fine water-power and timbered tract of land is owned in connection with the mine. Mr. Edward Barnes, whose post-office address is Woodford's, Cal., is the owner of this mine, and is now conferring with capitalists for the sale of the property at a large figure. The mine is closed for the winter.

The Illinois California Silver Mining Company mine is situated 6 miles south of Markleville, in Alpine mining district. Consists of 1,000 feet on the great Eastern lode. The improvements of the mine consist of a tunnel 1,832 feet in length, and a number of lateral drifts and cross-cuts, boarding-house, &c. Work in the tunnel has been prosecuted for a number of years, and when the mine is properly opened it is believed will handsomely remunerate the stockholders, who principally reside in Chicago, Ill., where the office of the company is.

There are a number of other mining claims in the county of a very promising nature, but whose owners are unable to develop to a greater extent than by the yearly expenditures of the hundred dollars required by the United States mining laws to protect them from relocation.

There is but little placer mining in the county. The Alpine Hydraulic Company have 160 acres of gravel on the banks of the main Carson River, about one mile southeast of Markleville. In December, 1881, the company commenced a ditch to take water from the Pleasant Valley Creek, and during the winter and spring completed it to their claim. The ditch is about 3 miles in length, 22 inches in depth, with a width of 2½ feet on top and 22 inches on the bottom, and is capable of carrying 400 miner's inches of water. The pen-stock is constructed about 40 feet in height from the ground, where there is 40 feet of hose attached, leading to the portion of the claim where the company have commenced piping. The pressure from the pen-stock to the place of piping is 100 feet fall, and the water is forced through a 2-inch nozzle with such force that the banks are crumbled and bowlders roll rapidly down towards and into the sluices, which are eleven in number and 175 feet in length, set with a 16-inch fall. This claim has been prospected for years past by many different persons, all conceding that it prospected well in gold, but owing to the amount of labor required in the constructing of a ditch to carry water to the ground nothing was done until the present company inaugurated operations.

AMADOR COUNTY.

Amador County is now accessible at all seasons of the year by rail from Oakland to Ione City in about eight hours' travel. About the first quartz mines opened and mills erected in the State were in this county. The great mother lode, as it is called, runs through the entire length of the county, commencing at the forks of the Cosumnes River on the boundary of El Dorado County, and can be traced to the villages of Plymouth, Drytown, Amador City, Sutter Creek, Jackson, and Hunt's Gulch on the Mokelumne River. After crossing the river it develops itself at the Gwin mine in Calaveras County. It can be further traced the entire length of the State to the Arizona line.

At Plymouth is located the Empire mine, which has been successfully worked for the last five years. The shaft has been sunk to a depth of 1,200 feet; the ledge is 70 feet in width, and the rock crushed in the company's 80-stamp water-power mill averages about $9 per ton. The company also have steam-power in reserve in case of failure of the water supply. About 120 men are employed and the mine produces largely.

Adjoining the Empire is the Pacific mine, on which a shaft has been sunk to the depth of 1,700 feet. The ledge, which is 40 feet thick, is said to yield $16 per ton. It has an 80-stamp water-power mill, and yields a large income to its owners.

At Dayton is located the Seaton mine, which, after lying idle for several years, has lately been opened by a tunnel 250 feet in length, which tapped the ledge, showing a width of 30 feet, and producing rock that yields $6 per ton. The company has a new 20-stamp water-power mill which is in successful operation and is reimbursing the owners for their outlay.

The Bunker Hill, located at the same place, has a shaft 600 feet in depth, producing ore that yields $12 per ton. The company also has a 40-stamp water mill which has produced a large amount of bullion.

At Amador City is located the celebrated Keystone mine, which has been worked continuously and produced largely for the last twelve years. It has a shaft 900 feet deep, and the rock is said to have yielded about $16 per ton. This company works a large force of men, have a 40-stamp mill in constant operation, and the property is known to have been one of the best paying mines in the State.

The Hayward claim, near the Bunker Hill, is employing quite a force of men prospecting with an assurance of ultimate success.

The Maryland mine is being thoroughly prospected by an English company, the owners of the original Amador at Amador City.

Sutter Creek.—At this place is located the Mahoney mine, which has been opened to the depth of 900 feet. The mine has been worked with varied success; recently a fine body of ore has been struck which yields $6 per ton in free gold. A large force of men is employed, and a 40-stamp water-power mill kept running.

The famous mine, called the Consolidated Amador, formerly the old Hayward mine, which has paid largely for the last twenty-five years, is now owned and has been recently worked by an English company. The mine is shut down for the present, but work will soon be resumed by sinking the old shaft to a much greater depth. This mine has an 80-stamp mill.

The Wildman mine is situated between the Consolidated Amador and the Mahoney mine. It has a shaft sunk to the depth of 500 feet. A level is also being run from the 800 foot level of the Mahoney mine to tap the ledge of the Wildman at that depth. This mine was in a prosperous condition once, but it has been in litigation for a long time and thereby closed. It is looked upon as one of the most valuable mines in that district.

At Jackson, the county seat, is situated the Coonie mine, now called the Zeile mine, which was worked many years ago, but has laid idle until recently. The present owner has had it reopened. New shafts have been sunk, the old one opened, new hoisting works erected, a new 40-stamp mill erected, and everything moves along smoothly under its efficient foreman. The mill is kept steadily at work crushing 100 tons of ore per day. The ore body on the 200, 400, and 600 foot levels in places is very large, reaching a maximum of 50 feet between the walls, and will average 40 feet. The rock is low grade and is assorted in the mines; the best sent to the mill, the balance thrown aside in the drifts. It is by careful system of working that the mine is made to pay. The rock only pays $2 per ton in free gold and from $5 to $6 per ton in sulphurets, which brings the yield up to a fair average. This proves that with good management and strict economy, together with good facilities for mining and working the ore, it can be made to pay when of very low grade. There are thousands of quartz ledges in this State that could be worked and made to pay handsomely if the same system was adopted as by the Zeile mine. Quartz mining would receive a wonderful impetus in California if a proper system of mining and milling and the saving of the sulphurets were adopted. A good deal of prospecting has recently been done in the Zeile mine. In running north a new ore body was reached and a large amount of work done to ascertain its value. It has been found to increase in size and richness, and the present outlook is that the ore in sight will last for many years. Attached to the mine are chlorination works, which are kept running day and night, working from 4 to 5 tons of sulphurets every twenty-four hours, yielding large returns.

The Downs mine, 1½ miles north of the town of Volcano, is in successful operation and yeilding well in the precious metals. It has a shaft 500 feet in depth, a mill of 20 stamps with all the modern improvements, and the rocks pay about $16 per ton.

The Acme mine is located a few miles above Volcano, and is being regularly worked through a shaft which is down 350 feet. They are also running a tunnel to tap the ledge 150 feet deeper. The rock yields $15 per ton in free gold.

The Stewart mine is situated on the Mokelumne River, 4 miles above the bridge that crosses the river on the road from Jackson to Mokelumne Hill. It has a 5-stamp mill and the rock pays $12 per ton, milling process.

The Tellurium mine at Pine Grove, 6 miles from Jackson, is a paying property. It has a 5-stamp mill and the rock yields about $16 per ton.

In the South Spring Hill mine the shaft is being sunk with three eight-hour shifts, and the owners intend to sink it 800 feet before drifting.

The New York mine, located on the south side of Jackson Creek, 1 mile south of the Kittridge mine, has lately struck a ledge of good milling ore, ten feet in width, and the cross-cut has not yet reached the foot-wall.

The Modoc mine, in Pioneer district, has had rock crushed at the Mace mill that yielded $47 per ton.

The Alpi mine is located 1¼ miles southwest of Jackson. There is a shaft 40 feet deep, with a well-defined ledge at the bottom 8 feet thick. The ledge has been uncovered for a length of 500 feet, and it is estimated to pay from $6 to $8 per ton by mill process, excluding the sulphurets, of which it contains a heavy percentage, the assay value of which is about $120 per ton.

The De Witt claim at Hunt's Gulch, 3 miles from Jackson, is from the want of supply of water not in operation. It contains pockets which are paying well. The gold is contained in a soft, decomposed quartz, which often yields from $20 to $30 to each bucketful, which pays from $40 to $50 per day to the hand. These rich seams indicate that if followed to a sucifficent depth they would come together and form a permanent ledge.

The Jackson mine is situated within the town site of Jackson. It is owned by Ginnochio Brothers. The mine has commenced operations, using a patent whim for hoisting purposes. Taking out ore for crushing will be in order as soon as the levels can be run.

The Kelley mine, in Hunt's Gulch, is being worked with energy. It belongs to Boston capitalists, who have expended large amounts of money in opening the mine. A tunnel has been run into the mountain 540 feet and a cross cut 130 feet prospecting for the ledge. Attached to the mine are fine hoisting works and a 20-stamp mill, with all the modern improvements.

Next to the Kelly mine in Hunt's Gulch is the Amador Queen, owned by on old pioneer miner, Mr. James Morgan, who has run a tunnel 900 feet in length and cut a ledge of enormous size, being 170 feet in width. Thirty feet of the rock next to the hanging wall will pay $10 per ton, while a streak from 10 to 12 feet in width next to the foot-wall will pay $9 per ton. Streaks of pay quartz, porphyry, and barren rock fill up the balance of the ledge. Two hundred tons of rock were recently crushed at the Moore mill, which yielded $9 per ton in free gold and 5 per cent. of rich sulphurets.

The Beck mine, located on the old Spanish claim in the Jackson district at Murphy's Gulch, has a shaft 250 feet in depth. It has a 10-stamp mill and is paying well.

The gravel mines in Amador County are mostly located at Volcano. Hydraulic mining is carried on quite extensively. The consolidated Amador Hydraulic, Telegraph Hill, and George Toop claims are energetically worked and paying well.

The Grass Valley Hydraulic Company intend putting up a pump and derrick to keep the water out of a pocket which has been found. It is exceedingly rich but cannot be worked without pumping and hoisting machinery.

The Lamping Gravel claim near Ione City is owned by a company of Eastern capitalists, represented by P. A. Lamping, and have gone into the mining business on a larger scale than has been attempted in that section for many years. The field of operations is on Mule Creek, about 3½ miles from Ione City. The land is owned by the Grant company, but 40 acres have been leased for a term of ten years for mining purposes. The 40 acres comprise what is regarded as the best auriferous land in that vicinity. Its gold-bearing character has long been known, but it cannot be worked to advantage by the ordinary method of gravel mining, from the fact that the country is level; there is no natural fall, no gravel bank, and consequently no dumping facilities. In addition to these drawbacks, the pay-dirt is buried under from 20 to 25 feet of alluvium. Owing to these obstacles the seam of pay-gravel has remained unmolested, although a few miners have been usually found scratching around there during the rainy season. The present company, however, has started the work in a systematic manner. Mr. Lamping went east a few months ago and purchased the necessary machinery in Philadelphia at a cost of about $15,000. This machinery consists of a 40 horse-power engine, a dozen scrapers to be operated by steam, and a quantity of other apparatus. Most, if not all, of the machinery is now on the ground. From 20 to 30 men are employed at present, getting the claim in order. A number of scrapers have been operated by horse-power, removing the dirt from the surface. The point of operation is about the middle of the 40-acre tract. It is slow work to strip off a layer of earth 25 feet in thickness, but when a hole is once made to the bed-rock the subsequent working will be comparatively easy. The company has purchased the old McDonald ditch, which brings water from Dry Creek, and when in full blast is expected to use 600 inches of water.

BUTTE COUNTY.

Butte County, situated in the north central part of the State, is an important mining county. Its area is about 1,700 square miles, one-third of which is agricultural valley land and the remainder foot-hills and mountains; 552,960 acres are classed as mineral lands. The western and northwestern portions of the county are drained by the Sacramento River, Dry Creek, and Little and Big Creeks. The rest of the county, comprising by far the greater portion of its surface, is drained by the Feather River and its several tributaries, Honcut Creek in the south, and thence, in order going north, the South Fork, Middle Fork, North Fork, and West Branch of the Feather River. All of these streams excepting Feather River and Honcut Creek run through mountain gorges or cañons, thus dividing the mountain portion of the county into a succession of ridges or divides, as they are locally termed. The general course of the streams and slope of the land are to the south and southwest.

Oroville, the county seat, the northern terminus of the California Railroad, is a rich commercial town of about 2,000 population, situated just within the edge of the foot-hills on the south bank of Feather River. Besides being itself the center of a rich mining district, it is the distributing point for nearly all the towns and camps in the county. Wyandotte and Bangor are southeast in the foot-hills, distant 8 and 14 miles respectively. Forbestown and Clipper mills are on the divide between the South Fork of the Feather River, and tributaries of the North Fork of the Yuba River, distant, respectively, 22 miles and 30 miles. Cherokee Flat, the principal town in the county, whose industry is entirely mining, is 12 miles north of Oroville.

Dog Town or Magalia, Lovelocks, Nimshaw, Powelton, and Inskip, small mining camps on the divide between the West branch and Butte Creek, are all tributary to Oroville. The small mining camps on Big Butte Creek are supplied from Chico, situated in the western part of the county.

Gold placer mining in its several forms is the principal mining industry. From the hydraulic mines comes by far the greater part of the annual gold product. Next in importance come the drift mines; then bar, river-bed, ravine, and gulch mining. Least important, so far as gold product is concerned, come the quartz mines. Through the western part of the mountainous portion of the county a series of gravel deposits, capped in many places with basaltic lava, extends in a general north and south direction for about 30 miles. Whether or not these gravel deposits are the remains of an ancient river system and parts of the same channel and its tributaries is still undetermined.

In the vicinity of Lovelocks, Nimshaw, and Dogtown the deep gravel mining done has seemed to be in a number of comparatively small blue-gravel channels, some of them being extremely rich in coarse gold. It is claimed that these are only tributary to a yet undiscovered large channel, indications of the presence of which have been observed.

At Cherokee Flat the gravel deposits, interstratified with large bodies of the so-called pipe clay, are of great depth and immense extent; the gold taken out is fine, what is known as flour or scale gold.

At Morris Ravine, 6 miles farther south, similar gravel deposits are found; these reappear on the other side of South Table Mountain, the last lava cap to the gravel as we go south, and are continuous and of great extent to some distance south of Oroville, where they again disappear. They again are found at Wyandotte, 8 miles southeast of Oroville, and continue to beyond Bangor, 14 miles.

All of these gravels, so far as they have been opened for examination, present essentially the same general characteristics, and belong evidently to what are known as the blue lead channels. A section of a gravel bank in the Enterprise hydraulic mine at Morris Ravine showed, commencing at the surface, 4 feet of loose red quartz gravel containing float or scale gold; 40 feet white quartz gravel, containing fine gold; 30 feet of pipe-clay, barren; 6 feet of round blue quartz gravel, containing coarser gold than the preceding—what is termed wash gold; 8 feet of broken quartz, gravelly fragments, and sand, containing fine gold; and then, resting directly on the bed-rock, 2½ feet of sand and black flat-wash gravel, containing coarse, heavy, wash gold. The three lower strata can be profitably worked by drifting.

Just south of Oroville a shaft has been sunk 172 feet into the gravel. It passed first through 62 feet of loose red gravel, containing fine scale gold in amount sufficient to justify working by drifting; then through 100 feet of cemented blue gravel, containing some gold but impracticable of being economically worked; then 10 feet into loose blue gravel mixed with large bowlders and containing coarse, heavy gold. This is believed to rest directly on the bed-rock, but influx of water beyond control by the pump used prevented the shaft from being sunk any deeper.

At Bangor a shaft sunk many years since in the Kendall mine passed first through 15 feet of loose red surface gravel, then 95 feet of cemented blue gravel to the bed-rock. This latter, close to the bed-rock, was extensively drifted, and worked in a stamp mill proved very rich. These great gravel banks, though continuously worked for the last thirty five years, contain much untouched ground, and beyond all question yet contain many times as much gold as has been already taken out.

The hydraulic mines in Butte County are not numerous, and, so far at least as opened and worked, are, with some scattered exceptions, confined to a few points on the great gravel deposit just mentioned. Cherokee Flat, Morris Ravine, and the immediate vicinity of Oroville are the principal localities.

Drift mines are for the most part, so far as at present working, confined to the divide between the West Fork of the Feather River and Butte Creek, in the vicinity of Dogtown, Nimshaw, and Lovelocks.

Many mines that are or have been worked by the hydraulic method are also worked by drifting. Bar, river, and ravine mining are still carried on at points all over the mining districts of the county, and in the aggregate produces a considerable amount of gold.

Though but few quartz mines have produced bullion during the past year, there is a large amount of prospecting going on, which bids fair to develop some paying mines.

Inskip.—Some surface placer mining in a small way is being done, 12 or 15 men in all being employed.

Powelton.—The character of mining at this place is similar to that at Inskip, surface placers which afford wages to 12 or 15 men.

Lovelocks.—In the vicinity of this place there is considerable mining and prospecting; lack of water, except during a few months of the spring, has retarded developments.

The Merideth quartz mine, owned by J. J. Merideth, was worked profitably during the water season. The quartz is very much decomposed, and the ledge has been worked as far as practicable by hydraulicking. A 5 stamp mill, run by water-power, is employed during the water season crushing quartz from this mine. The result of two months' run, all the time during which water could be had this year, was $6,000. The future prospects of this mine seem to be excellent.

Another quartz ledge similar to the Merideth has been prospected for three or four years past by Dr. A. K. Stern. His property is known as the Mountain View quartz mine, or the Tom Neal diggings, and is situated about one mile south of Lovelocks. Some remarkably fine gold quartz specimens have been obtained from this mine. Ten or twelve men are employed, but work can only be done in winter.

Several other quartz ledges in this vicinity are being prospected with encouraging results.

Messrs. Woodman, Garland & Wilcox are working their drift mine steadily. It is opened by a tunnel 200 feet long, and is paying well.

On Kimshew Creek, a few miles east of Lovelocks, considerable prospecting is being done. Snow & Co. have sold their hydraulic mine, and it is the intention of the purchasers to fit it up and work on a large scale during the coming year. The deposit of gravel is extensive and rich, but water being obtainable for only two months has prevented any large yield of gold.

Nimshaw.—Kirk & Cole have the tunnel on their drift mine in 1,800 feet, and employ 15 men. This claim is yielding considerable gold and paying its owners well.

The Lucky Strike Mining Company are prospecting. Their claim comprises about 230 acres. It has been opened by ten or twelve tunnels, and has paid largely; the present prospecting tunnel is in 400 feet. Some quartz has been found, but the main channel for which the tunnel is being run has not been found yet. Several other drift claims and quartz ledges in this vicinity are being prospected.

At *Magalia* the Magalia drift mine comprises 200 acres, and is opened by a tunnel 2,300 feet long. The channel now being worked is very narrow, varying from 5 or 6 to 20 feet, but is extremely rich. It is claimed that $185,000 have been taken out of the last 500 feet of the channel, and from a single car-load of gravel $11,000. Twenty men are employed, and the average weekly yield during the latter part of 1882 was $12,000.

The Indian Spring drift mine, which had yielded largely, was some years since considered worked out and abandoned. It was relocated in June of 1881, and has been paying well ever since. Six to eight men are employed, and the weekly yield is from $600 to $800. It is a very promising mine.

The Garfield drift mine adjoining the Indian Spring is being prospected. It has yielded considerable gold, and its prospects for the future are good.

Fulton & Co. are drifting and hydraulicking a high bar on the West Branch of the Feather River; their claim is paying well.

Butte Creek.—Scattered along Butte Creek are several small hydraulic and drift mines, the most important of which are Mineral Slide, Red Gravel, and Paradise Flat, hydraulic mines, and the Nichol & Longley, drift mine.

The Mineral Slide, comprising 120 acres of land, is on Butte Creek, 5 miles south of Magalia. The mine is run the entire year by water brought from Butte Creek by a ditch 5 miles long; 800 inches are used under about 300 feet pressure. The gravel is loose and mixed with large lava bowlders; 8 men are employed, and the mine is paying well.

The Red Gravel has been worked for several years past profitably. Considerable good ground remains to be worked.

The mines on Butte Creek all seem to be yielding a fair amount of profit, and their prospects for the future are very promising.

Yankee Hill.—In this vicinity are a large number of quartz ledges which are being prospected to a greater or less extent all the time. No one of them has, however, as yet been developed into a mine, and the work done except in a few instances is not sufficient to determnie their value.

By far the most important mining enterprise in this vicinity is on what are known as the Big Bend Tunnel and Mining Company claims. These claims comprise some 13 miles of the bed of the North Fork of the Feather River, located around Big Bend, and a tunnel claim across the chord of the Bend. The tunnel will be used to carry the water of Feather River during the summer months, thus leaving that portion of Feather River around Big Bend free enough from water to mine effectively. Work on the lower end of the tunnel from "Dark Cañon" has been commenced and the face advanced 225 feet; the Burleigh drill and air compressor are used, and it is intended to run the tunnel from the lower end only. Forty-five men are employed in all capacities.

The dimensions of the tunnel are to be: length, 12,007 feet; width, 15 feet; height, 8 feet. It is expected that two years will be required to complete the tunnel, and the outlay before any returns can be had is estimated at $1,000,000. The enterprise is being undertaken by a company of Eastern capitalists of abundant means. If the past enormous yield of the bars and parts of the channel worked on Big Bend furnish any data by which to estimate the probable amount of gold yet in the river bed, it is safe to say that the amount is far in excess of the yield of any single mining enterprise yet carried out in California. Dr. R. V. Pierce, of Buffalo, is president of the company, and N. A. Harris superintendent of the work at Big Bend.

Cherokee Flat.—The Spring Valley hydraulic gold mine at this place is the largest hydraulic mine and the greatest bullion producer in the county. It is the only one of the large hydraulic mines running at the present time having solved the *débris* question, so far as it is concerned, by buying all the farms subject to overflow. A large part of their ground is covered with a lava cap, and can only be effectively worked by drifting. In the hydraulic ground the banks are very high, reaching a maximum of about 500 feet; on an average, two-thirds of this contains gold. The average daily amount of water used is from 2,200 inches in the summer to 3,000 inches in winter, the sources of supply being Butte Creek, west branch of Feather River, and in the winter the watershed around the mine.

The following figures will give some idea of the expenses and resources of this large hydraulic mine. For the ten years from 1870 to 1880 the expenditures of the company were—

For ditches, pipes, flumes, and reservoirs	$480,000
For mining ground	411,113
Expenses of mining, tunneling, &c	921,907
For farming lands subject to overflow	395,196
For levees and improvements on this land	154,708
Dividends	465,000

The total yield of gold during that period was $2,650,809.

Large areas of both hydraulic and drifting ground are yet unworked; also a large proportion of the blue bed-rock gravel uncovered by hydraulicking, but which could not be worked until recently, owing to lack of necessary grade. By the construction of a bed-rock tunnel about 3,000 feet long this bed-rock blue gravel can now be worked, and as it is very rich, the output of the mine will without doubt be largely increased during the next few years.

The mine is part of an ancient river channel adjoining and underlying the North Table Mountain of Butte County. Width of channel, so far as determined, about one mile; length undetermined, as the fully defined channel runs under the basalt-covered Table Mountain.

The strata consist of a lower deposit of closely-cemented blue gravel, from 3 to 50 feet in thickness, containing bowlders from a few inches to 18 inches in diameter, though back from the channel, on the rims, and occasionally in the deeper channels, bowlders are found in quantities as much as 5 feet in diameter. This deposit is of close metamorphic slate, intermingled with quartz bowlders and pebbles and fine quartz sand, which contain throughout coarse gold. Surmounting this is another stratum of blue gravel, a separate and distinct deposit of a lighter blue color, composed of smaller bowlders of talcose slate and a large admixture of quartz. This varies from 6 inches to, say, 12 feet in thickness, and the upper part of the same to a depth of about 4 feet is totally decomposed and has turned yellow, so that the bowlders peel off like amygdaloids. This is the richest stratum and pays largely.

Above the last is a deposit of fine white-quartz gravel and sand, which is in places 350 feet in depth; towards the east side of this stratum lie great masses of pipe-clay, in spots as much as 150 feet thick. The mining ground proper of this company consists of about 1,200 acres, 500 of which are free from cap rock, and about 120 of which have been worked. The face of the bank is 500 feet in height, and the deepest tunnel is 97 feet lower than the face mentioned.

The mine is worked through three bed-rock tunnels, the largest and deepest of which was run during the past year, and cost $136,000; it is 10 by 10½ feet, and 3,000 feet in length. The mine is equipped with 2 miles of tailing flumes, or rather a triple line of flumes 2 miles in length, consisting of two flumes 6 feet wide and one of 4 feet, laid side by side, and divided into sections of about 1,000 feet each, so that any part can be cleaned up without stopping the mine. There are also eighteen undercurrents, sixteen hydraulic giants, and at least 3 miles of 22 and 30 inch piping on the claim proper.

The mine has been worked since the year 1853, and, estimating from past work, should reasonably be expected to last on the present large scale of washing not less than twenty-five years.

Though the mine has never been bottomed till during the past summer, and the deep tunnel before mentioned is not yet safely opened, a largely increased yield of gold during the next ten years is expected. An average of men employed is as follows: In the mine, 120; on ditches, 15; on levees and outlet, 20; all white labor.

The water supply of the mine at this date is 3,000 inches, miner's measurement, which is brought to the mine through 75 miles of ditch, along the length of which are three iron pipes 30 inches in diameter, the longest being 13,100 feet, and having a depression from the grade line of 892 feet; the second 3,780 feet, with a depression of 630 feet.

There are also ten reservoirs, of which two are for mountain storage, one 12 miles distant, covering 240 acres, and the second, 60 miles distant by line of ditch, on the summit of the Sierra Nevadas, covering 60 acres.

The original cost of introducing water and fitting up the property was $582,820, after which $480,000 was expended for mining ground within the present patent limits, the money being paid to individual holders, and all of the above-mentioned sums except $145,000, the cost of the first pipe and ditch, were paid directly from the profits of the mine.

This company has also a canal for its tailings, 40 miles in length, and not less than 400 feet in width, with banks 30 feet thick, and about 3,000 acres for dumping. During the past five years two *débris* dams have been built, each about 2,000 feet in length, for storage of tailings, and have been found to answer the purpose admirably, and so far as this mine is concerned definitely solve the *débris* dilemma.

The Sinclair Flat hydraulic mine, located 2 miles west of preceding one, is also one of the important gold-producing mines of the county. The gravel is similar to that in the Spring Valley, and is, like it, capped with a heavy deposit of pipe-clay. One thousand inches of water, under a pressure of 175 feet, is used, and the gravel being comparatively soft, no bank blasting is done. About ten men are employed. Considerable ground remains yet to be washed, and the mine will undoubtedly be moderately profitable for many years to come.

The Gregory and Welch hydraulic mine has not been worked for some time, but will probably commence running again during the next few months.

The Spring Valley drift mine, situated 1 mile east of Cherokee, on the flat at the head of Spring Valley Gulch, has been mined continuously for many years, and is doubtless paying largely at the present time. The mine is worked through a shaft 50 feet deep.

The old Joe Young ledge, on the North Fork, 3 miles east of Cherokee, is being prospected anew by a tunnel. It has yielded a large amount of gold in the early days of mining in this State, and its prospects for the future are excellent.

Oregon City.—In this vicinity are nearly all the important quartz ledges in this county. Though successfully and extensively worked in early days, very few are even being prospected at the present time. There is no good reason for this, for some of them only require thorough, systematic prospecting to become important mines.

The Banner, the principal quartz mine in the county, has only recently started up, under the superintendence of C. W. Keeney. The vein or lode has a north-and-south course, with a slight pitch to the east. The foot-wall is a black, metalliferous slate, and the hanging wall porphyry, In the lode are several veins. The mine is opened by a shaft 300 feet deep; 1,000 feet of drifts on the 100-foot level and 800 feet of drifts on the 200-foot level have been run. A new vein has recently been struck, 100 feet east of the old workings, which gives very promising indications of coming richness. The hoisting works are steam, and have power sufficient to sink 1,000 feet. The mine is also equipped with a first-class 10 stamp steam-mill.

To date, the mine has yielded $600,000 from about 10,000 tons of ore, an average of $60 per ton. Few mines in the State can make as handsome a showing, considering the small amount of development made and the little depth reached. It is fair to presume that the Banner may yet be one of the principal quartz mines in the State.

Morris Ravine.—There are several very promising hydraulic and drift mines at this point. The Hendricks, Enterprise, Perkins, Sparks Company, Blue Star, and Butte Drift are all rich mines on which comparatively little work has been done. None of them are working at present, nor will much work be done until a final decision is obtained from the courts on the "*débris* question."

The Hendricks has been for several years past one of the important gold-producing mines of the county, and its large deposit of gravel is but just fairly opened. It and all the mines adjoining can be profitably worked by drifting.

Oroville.—Though situated in the midst of, and, in fact, on one of the most extensive and rich gravel deposits in the State, there is very little done at mining. All of the mining done in this vicinity is practically entirely by hydraulic.

The Miocene Mining Company's claim covers about 500 acres on the river bank opposite Oroville. Nearly all of this is auriferous gravel, and can be hydraulicked, but is not rich enough for drifting. The company own about 33 miles of ditch, bringing water from the west branch of Feather River. The claim cost, when fitted up and ready for work, in the spring of 1881, about $300,000. It has only been worked for two months in the spring of 1882, being then shut down by injunction pending the decision of the courts on the right to dump tailings into the Feather River. The claim is very rich, and would, if running, be beyond question one of the largest gold-producing mines in the county. No other hydraulic mine is working at Oroville, all being shut down by injunction.

The Treasure Box Mining Company are running a tunnel in their drift-mining claim, which comprises about 325 acres of South Table Mountain. The tunnel, which has been run under exceptionally favorable conditions, costing only about $7 per foot, is in 4,000 feet, and several prospecting drifts have been run. Some fair prospects have been obtained, and all the indications are favorable to the development of a first-class drift mine.

The Lava Beds, worked so extensively by the Chinese a few years since, are now abandoned, from the impossibility of keeping the pits clear of water except by very expensive and powerful pumping machinery.

Mountain House.—Berringer & Graber are prospecting their quartz ledge, with encouraging results. They have a ledge in talcose slate about 2 feet thick, showing considerable free gold.

Moorville Ridge.—Two large hydraulic mines are in operation on this ridge, and several undeveloped locations made.

The Dodson hydraulic mine comprises about 70 acres of auriferous gravel, varying in depth from 60 to 200 feet. The gravel is for the most part soft, but occasional spots of cemented blue gravel and hard sand streaks occur. The gold is fine; from 1,200 to 1,500 inches of water is used under 220 feet pressure; the water is brought from Lost Creek by a ditch 10 miles long, the water season lasting from 90 to 120 days.

The Frost and Reese hydraulic mine adjoins the Dodson, and the character of gravel is similar. The company own a ditch 12 miles long and bringing 2,000 inches of water from the South Fork of the Feather River. They also have a storage reservoir covering 60 acres in Little

Grass Valley, and have a head of water from eight to eleven months during the year. The work thus far has been in opening and fitting the claim for effective work.

The cost of fitting up, including ditch and reservoir, was $70,000. Both this mine and the Dodson are valuable mines, and will be large gold producers for many years.

Mooretown.—Considerable prospecting of quartz ledges is being done in this vicinity, and some mines being developed that look very promising.

The Baranca, on which there is a 5-stamp mill, has been recently sold, and it is the intention of the purchasers to thoroughly explore and develop their property, which is considered very valuable.

Fairview.—The old Rattlesnake quartz mine has been reopened and a 5-stamp water-power mill put up. Considerable pay ore is in sight, and the outlook for the property is considered promising.

Forbestown.—But little mining is being done in either placer or quartz. There are a number of quartz ledges in the vicinity from which a few tons of rock are occasionally taken and milled. No systematic sustained attempt is made, however, to thoroughly open and prospect any of these. All of the shallow placers in this vicinity, once so rich, have been worked out and abandoned.

Clipper Mills.—The only mine working at this point is the King Bird hydraulic and drift mine, employing three or four men. It has been worked and has paid for the last twenty-five years, and it can be worked with a moderate degree of profit for many years yet.

All over the county are found small placers worked occasionally, and in the aggregate producing annually considerable gold. Though not as much mining is done by Chinese now as a few years since, the aggregate of their production is still large and important. It is impossible to more than estimate this yield, as much of it leaves the county in private hands. A fair estimate of this production is, for the year 1882, about $60,000. The sources of this yield are the bars and river beds of the several forks of the Feather River and its tributaries, and the gravels in the vicinity of Oroville.

The following are the main mining ditches in the county, their length, sources of supply, &c. In addition to those named, there are many short ditches of small capacities supplying water for individual mines:

Name.	Source of supply.	Length of mining ditch.	Maximum capacity.	Carry full head during year for—	Supply water for the—
		Miles.	*Inches.*	*Months.*	
Frost & Reese	South Feather	12	4,000	8 to 11	Frost & Reese, hydraulic.
Dodson	Lost Creek	10	1,200	3 to 4	Dodson's hydraulic.
South Feather	South Feather	......	2,000	....	Wyandotte and Bangor, or New York and Ophir Flats.
Hendricks	West Branch	50	1,000	12	Morris Ravine mines.
Lamonte	Little Butte Creek	5	1,000	12	Mineral Slide hydraulic.
Miocene	West Branch	32½	3,000	9	Miocene hydraulic.
Oroville Lumber Company	do	8	1,500	9	Sinclair Flat hydraulic.
Powers	Little Butte Creek	30	500	9	Powers hydraulic, at Oroville.
Red Hill	West Branch	3	1,000	12	Red Hill hydraulic.
Feather River and Ophir	South Feather	......	1,500	12	Mines on the south side of Feather River at Oroville.
Shepherd	Big Butte Creek	8	4,000	12	Mines on Big Butte Creek.
Spring Valley	Big Butte Creek and West Branch.	80	3,000	12	Spring Valley hydraulic.

During the year there have been in operation, for some of the time at least, thirteen hydraulic mines, only two of which, the Spring Valley and Sinclair Flat, have yielded much gold. Seven drift mines have been producing, most of them small, and two or three others prospecting and opening up preparatory to taking out gold; also four small quartz mines have made short runs, yielding but a small amount of gold, and two others opening up preparatory to active operations during the year 1883.

Though there will be no extension of the mining industry to speak of, the aggregate of gold production for 1883 will probably be much increased from a prospective better yield of those mines at present being operated.

CALAVERAS COUNTY.

Geographically considered, Calaveras occupies the heart of the great mining belt of the State of California. Extending from the Mokelumne River on the north to the Stanislaus River on the south, and from the crest of the Sierras on the east to the verge of the great San Joaquin Valley on the west, the county embraces an area of some 1,200 square miles, including one of the very best and most promising sections of the entire mining region. Topographically, the country could not be more favorably fitted for mining purposes. The face of the country is so diversified that in a great majority of instances mines can be worked either by adit or shaft, as best suits the ideas or convenience of owners, while the same topographical advantages render the utilization of the waters of the numerous streams for mining purposes not only possible, but comparatively easy of attainment.

The mining interests of Calaveras comprise both quartz and gravel, and from the flush times of early days down through all the transitions the mining region has undergone this county has steadily maintained a commanding position, both with reference to productiveness and affording desirable opportunities for investment. Of the two interests, quartz is the more important. The quartz zone is fully 30 miles in width, extending diagonally across the entire length of the county from north to south, embracing in its extent an almost illimitable number of ledges. In fact, the county is absolutely rock-ribbed with gold-bearing lodes, that only await the muscular craft of the miner, re-enforced by the powerful countenance and support of the capitalist, to pour their golden treasures into the commercial arteries of the world. Properties can be seen in all stages of development, from the full-fledged, dividend-paying mine, with its great mills and modern gold-securing appliances, to the modest whim-crowned shaft of the "prospector" whose reducing apparatus does not reach beyond the dignity of a mortar. For years the great work of development has gone steadily forward, and yet so wide is the field, so broad the opportunity, that there is still abundant room for the employment of labor and capital in promising enterprises. The mining outlook for Calaveras, with reference both to quartz and gravel, was never more flattering than it is to-day, and the assertion that this county affords greater inducements to those desirous of engaging in mining pursuits than any other section of the mineral belt will pass unchallenged.

The extent and variety of its mineral resources are practically unbounded. In addition to gold, there are extensive mines of copper, chrome-iron, manganese, tellurium, and hematite, together with quarries of marble and deposits of kaolin.

Comparatively speaking, these deposits of the more common metals are undeveloped, affording a most inviting field to the capitalist and speculator, as well as to the laboring miner.

The gravel-mining interest is only second to that of quartz. While it is true that the days of placer mining are waning and already numbered, still the auriferous fields of Calaveras are being energetically worked and are yielding well. Operations have simply been transferred from the shallow placers and gulches to the depths of the towering hills; the pick and shovel of the surface miner exchanged for the mountain-leveling appliances of the hydraulicker. Acres are washed now where rods were then, the greater quantity of earth put through the sluices compensating for the difference in its richness.

Vast beds of gravel have been uncovered, both by means of tunnel mining and hydraulicking, and it is safe to say that Calaveras's yield of precious metals from the gravel interest is greater to-day than it was ten years ago.

Operations are actually limited only by the amount of water available, and when it is added that there are several large ditches in the county that are put to their fullest capacity in supplying the demand, an idea can be obtained of the magnitude of the gravel interest. It is increasing in extent and importance annually, and the prospect for its future, like that of the quartz interest, is to-day brighter than it has been for years.

QUARTZ MINES.

Foremost in the county and holding an enviable position among the leading mining properties of the Pacific coast is the famous Gwin mine—a property that the annals of quartz mining furnish but few equals to and no superiors. The Gwin mine is situated 5 miles southeast of Mokelumne Hill. It is located on the great "northern" lode of the State, embracing 1,800 feet in length by 600 feet in width.

The mine was located as far back as 1851, some exceedingly rich rock being extracted from it then and subsequently. At that time, however, it was worked upon a very small scale and in the primitive manner that marked the commencement of the quartz-mining era. It was not until 1867 that operations were begun in good earnest, backed by capital and all the appliances appertaining to modern mining. Shafts were sunk, levels run, mills erected, succeeding which an area of prosperity dawned upon the mine that has been but briefly interrupted from that day to this.

In 1871 the Alexander mine, adjoining the Gwin on the north, was purchased and the two consolidated. From the most authentic accounts the mine has yielded at least $2,000,000, and is likely to place double that amount to its credit in the future. The ledge, which is well defined and contained in a true fissure, averages 7 feet in width. There are three shafts, of the depth of 1,500, 500, and 200 feet, respectively. There are fourteen levels, of lengths varying from 300 to 700 feet. The mine has several mills, aggregating 66 stamps, together with chlorination works, &c. The mills are run by water-power, and the pumps, hoisting-works, &c., by steam. The rock yields an average of $6 per ton; cost of extraction and milling, $3. An average of 120 tons is crushed daily. At present the mine is inoperative, pending the erection of new machinery of increased strength and capacity.

Boston mine.—This property, second to none in the State in importance, is situated in Buckeye Gulch, about 2 miles northeast of Mokelumne Hill. It was worked in a small way in earlier days, but some three years ago the mine passed into the hands of capitalists, who have since vigorously pressed forward developments. The ledge, which crops boldly out at the base of a high mountain, forming one of the sides of a gulch, is simply an enormous one, averaging fully 60 feet in width. Two tunnels have been driven into the hill on the lode, the longest being about 350 feet in extent. Cross-cuts show the ledge to be not only an immense one, but composed of a good quality of ore, carrying free gold rich in sulphurets. No mine in the State of which there is a record makes a better showing than the "Boston" so far as development has progressed. There are thousands upon thousands of tons of fair-milling ore in sight, and so superior are the facilities for its extraction that it can be mined and milled at a cost of $1.50 per ton. In fact, there are no limits to the future possibilities of the Boston, and taking the present favorable development as an earnest of what is to come, the time is close at hand when it will rank among the greatest and most productive mining properties of the coast. A short distance below the mine is a superior 20-stamp mill, run by water power, and fitted up with all the modern appliances. A tramway connects the mine and mill, by means of which the ore is transported from the former to the latter. About fifty hands are employed when the mine and mill are in full operation. Average yield of ore per ton is $6; average quantity of ore worked per day, 40 tons.

Lamphear mine. This, which is among the most prominent mines in the county, is also situated in the Mokelumne Hill district, in Spring Gulch, about 2 miles east of the town. The mine embraces 1,800 feet in length of a well-defined ledge, which has been sufficiently worked to develop a very valuable property. Two shafts have been sunk, to the depth of 160 and 130 feet, respectively. A level 300 feet in length has been run, showing a solid, well-defined ledge, averaging 5 feet in width the entire distance. An excellent 12-stamp mill, run very cheaply by water-power, belongs to the property. The mine is also furnished with substantial hoisting works and other necessary machinery for operating to advantage. Number of hands usually employed, 15; average yield of ore per ton, $7; cost of extracting and milling, $3.50.

The Bryan mine, situated in Buckeye Gulch adjoining the Boston, is a very promising location. Several thousand dollars have been expended, and the prospects are flattering. A shaft has been sunk to the depth of 75 feet, with very good indications that the Bryan will prove a very valuable mine. A tunnel has also been run and other work done.

At the junction, a short distance south of Mokelumne Hill, are the Quaker City and Hughes, mines that have been extensively worked, but are not now in operation. Locations of lesser note in the Mokelumne Hill district are the Bandin, Admission, and Mokelumne Hill.

Rich Gulch district.—There are several quartz locations in this district, the principal mine, however, being the Tiger, a promising property. Two shafts, 90 and 45 feet in depth, respectively, and a tunnel 400 feet in length represent the work done on the mine. The ledge shows 17 feet wide in the tunnel, the rock being of a fair grade. They have a 10-stamp steam-power mill; rock will yield an average of about $12 per ton; probable cost of mining and milling, $3.50.

The Beaver mine has yielded some of the richest specimen rock ever seen. Work upon it is now being prosecuted.

The celebrated Foot & Thompson mine is located in this district. The mine has yielded an immense amount of money, and only requires systematic working to resume payment.

Railroad Flat district.—The principal mine now being worked in this district is the Chicago and Rock Island. The mine is supplied with good hoisting works and a stamp mill, both run by water-power. Shaft 200 feet deep, lode from 1 to 5 feet in width, and the ore averages from $8 to $100 per ton. The shaft is to be sunk another 100 feet, and additional milling facilities provided. The ore in sight will keep the stamps in constant operation for the next six months. The Chicago bids fair to become one of the most valuable mines in the county. It is located one-fourth of a mile west of the railroad. The formation in which the ledge is incased is slate.

The Poe mine adjoins the Chicago on the south, and has a shaft 60 feet in depth. The Poe has furnished some high-grade ore, but requires capital to fully develop it. The ledge is from 1 to 3 feet thick and is well defined.

The Beede mine adjoins the Poe, and has the same general characteristics.

The Petticoat mine, parallel to and a little east of the Chicago, produced good ore in former years, when intelligently worked.

The Luxembourg has been worked to the depth of 50 feet; ledge, 16 inches thick, yielding from $10 to $60 per ton. The requisite capital could make this a dividend-paying mine.

The Bald Eagle and Herzer mines have been very productive, worked by hand to the depth of 90 feet. The ore is "ribbon" rock, with a large percentage of galena sulphurets.

The Seeman mine is the Fern or Chapman; shaft, 160 feet deep; hoisting works and an 8-stamp mill; ledge from 1 to 4 feet thick. Ore yields from $7 to $30 per ton. The mine is soon to be supplied with more powerful machinery, and will then prove very productive.

The Burt & Co. mine has a shaft 60 feet in depth; lode 3 feet in thickness, that will yield $12 per ton.

Lancaster & Co. are working a new discovery with profit; shaft, 20 feet deep; ledge, showing free gold, 20 inches wide.

Sundermeyer & Co. have also a location in this vicinity that prospects well.

The Prussian Hill mine was very productive at one time, but owing to litigation and bad management is now idle. Work is soon to be resumed. Shaft, 200 feet in depth; ledge, from 1 to 4 feet thick. The hoisting works and a 10-stamp mill have been removed from the mine.

The Enright mine has a shaft 60 feet deep. Ore mills from $10 to $30 per ton. A tunnel is being run to tap the pay chute 180 feet below the present works.

Glencoe district.—The Wolverine mine has been worked to the depth of 300 feet. It has yielded upwards of $50,000 superior ore, and a large body of it is known to exist in the mine.

The Poor Man mine, situated west of the Wolverine, owned by Lewis Brothers, was located in 1861; can be traced over 2 miles by croppings. Main shaft is 250 feet deep, and a level has been run 268 feet. The fissure is 7 feet wide. About 775 tons of ore have been worked from the mine, yielding over $63,000, upwards of $81 per ton. Capital is now required to put the property in proper shape for working to advantage, and there is no doubt but that the Poor Man will yet occupy a front rank among the mines of this county.

The Lawson mine, owned by the same parties as the Poor Man, is a promising property. Three shafts have been sunk, developing a pay chute 300 feet in length. Three hundred tons of unassorted ore have been milled, yielding an average of $12 per ton. It has been worked only to the depth of 40 feet.

The Glencoe mine is located one-fourth of a mile west of the Poor

Man. A large vein and good ore, a great quantity of which has been worked in the 8-stamp water-power mill on the mine.. The last ore worked paid $20 per ton. A tunnel has been run 500 feet on the vein, attaining a depth of "backs" of about 400 feet. It is a promising property.

The San Bruno, Good Hope, and Monte Christo mines have produced a large amount of bullion. They have been worked to a depth of 300 feet by tunnel and shaft. Ledges vary from 1 to 3 feet thick. Ore of very high grade. A fine 18-stamp steam-power mill belongs to these properties.

The Hadlock mine has been worked to the depth of 50 feet, and produced some good ore.

On the Mexico mine, owned by Lewis & Fairchild, seven shafts have been sunk along the line of the lode, covering a distance of 1,200 feet, the shafts varying from 40 to 115 feet in depth. The ore extracted yielded from $17 to $115 per ton. Very rich specimens have been taken from this mine, and upwards of $2,000 pounded out in a mortar during the past year. It is all "picking" ground, not a blast having been exploded in the mine. A tunnel is to be run to tap the vein at a depth of 150 feet. This is a very valuable property, and when properly opened will produce wonderful results.

The San Pedro is a promising mine of the district. Main shaft, 200 feet deep; ledge, from 1 to 4 feet thick. Ore has paid as high as $83 per ton.

The Banner mine has produced high-grade ore. Shaft, 200 feet deep; steam hoisting works, which are not powerful enough to keep the mine free from water; however, a good property if properly managed.

The Norwich has fine steam hoisting works and a well-defined vein, ranging from 2 to 30 feet in width. Shaft, 200 feet deep. The ore taken from the pay chute, which is upwards of 90 feet long, yielded about $20 per ton. The mine has merit, and is sure to be a success.

The Fidelity, belonging to the Norwich proprietors, is also a promising mine; a large, rich vein; steam hoisting works, &c. Shaft, 110 feet deep.

The Blue Jay has paid well, and is now being worked with flattering prospects.

The Alabama has four shafts sunk. Ledge from 2 to 15 feet wide; 234 tons of ore milled, yielded $23 per ton. The ore carries a large percentage of sulphurets. The croppings can be traced for miles and free gold found in many places. It is one of the best prospects in the county.

The Valentine is one of the oldest and best-known mines in the county. It has produced a very large amount of bullion. A great many improvements have been put upon the mine recently, including a 20-stamp mill, and preparations made for conducting operations upon an extensive scale. Machinery is to be erected with a view to sinking 500 feet deeper, the mine, so far, having been worked through tunnels. The lode varies from 4 to 40 feet in width, the quantity of good ore being practically inexhaustible.

Other mines of lesser note are the Canrada, Le Franchi, Woodcock, Zane, Occidental, Idonia, Barney, Centennial, Stonewall Jackson, Dory, Posey, and Charlotte.

West Point district.—The leading mine of this district is the Champion. It has been successfully worked for years, the depth at present attained being 900 feet. The fissure averages 8 feet in width. Champion ore is very rich, the lowest grade yielding $40 per ton, the best paying $180. Seven levels have been run on the pay chute. The mine is supplied with excellent hoisting works and an arrastra mill. It is one of the leading mines of the county.

The Lone Star has very fair prospects. Main shaft, 150 feet deep; tunnels tap the ledge 250, 400, and 650 feet below the surface. The rock pays from $30 to $100 per ton. There are now 400 tons of ore on the dumps. The ledge is from 2 to 20 feet wide.

The Carleton mine is worked to the depth of 160 feet, there being three shafts. The lode shows from 2 to 4 feet in width. The highest-grade ore pays $250 per ton, and the lowest $10.

The Star of the West has flattering prospects. Depth of shaft, 185 feet. A level has been run 165 feet. Ore pays on an average of $20 per ton. A 10-stamp mill is to be put up immediately.

The Old French mine has six shafts ranging from 50 to 110 feet in depth; the length of works, 700 feet. The ledge varies from 1 to 4 feet in width. Ore pays from $9 to $80 per ton. This mine has a flattering future.

Other mines in the district are Pride of the West, Pride of Bummerville, Scorpion, Rattlesnake, Valentine, Henry, Lockwood, Camille, Anna, Gouldson, Woodhouse, Whisky, Modoc, Billy Williams, Catarrh, and Barnes. All these mines have the same general characteristics, and have shafts from 50 to 120 feet deep, and all capable of furnishing high-grade ore.

Whisky Slide district.—The principal mine in this district is the Hoosier Consolidated. The Hoosier embraces three claims aggregating 3,600 feet. Development so far consists of two tunnels 150 and 200 feet in length respectively. Shaft 140 feet deep, with level at the bottom 130 feet long, shows eight thousand tons of rock in sight. There are also 700 tons on the dump, all of which will pay from $6 to $8 per ton. Six thousand dollars have been taken out by assorting the rock, and working it in an arrastra, the ore averaging $20 per ton.

The Mary Long, one of the constituents of the Hoosier, has a 90-foot shaft, showing a 2-foot ledge of $10 rock. A tunnel run in on the pay chute, which is 80 feet in length, furnished ore that paid $25 per ton. Although the tunnel worked the ground to a depth of only 40 feet, upwards of $10,000 were taken out. There are two shafts and several open cuts disclosing a 4-foot vein and $8 rock. The vein can be worked by a tunnel to the depth of 950 feet; free water-power during eight months of the year; remainder of the time water can be purchased. Two water ditches belong to the property. Ten stamps are to be put on the mine immediately, when it will unquestionably prove a very remunerative property.

Whisky Slide mine shows a 6-foot ledge of decomposed rock that will pay well.

The Livermore mine has a shaft 200 feet deep, and a 10-stamp water-power mill.

Sheep Ranch district.—One of the most productive mines in the State, the Sheep Ranch, is located in this district. The lode was discovered and located in 1865 by A. P. Ferguson. For a period of twenty-seven years the mine was very successfully worked by crushing the ore in arrastras. Then a 5-stamp mill was put up, the mine continuing to enrich its owners. The original location was 1,400 feet in length, which was subsequently increased 200 feet by the purchase of the Bean claim, a contiguous location. A few years since the mine passed into the hands of capitalists, who have already increased its production by supplying it with all the modern appliances known to quartz mining. The shaft is now 600 feet deep. The pay chute, which is about 700 feet long, has been penetrated by six levels, and the ore stoped out between them. The average daily output of ore is 60 tons; quantity crushed daily, 50 tons. The mill, one of the best on the coast, has 30 stamps. The rock yields an average of $11 per ton; cost of mining and milling, $8.

The Chavanne mine, consolidated with the Sheep Ranch, has a shaft 400 feet deep, and a 10-stamp mill. All the machinery connected with the Sheep Ranch runs by steam. As before remarked, the Sheep Ranch is one of the most productive in the county, and has a very promising future before it.

There are several mines of lesser note in the vicinity, among which may be mentioned the Calaveras, Harrington and Andrews, Wheelock and Rodgers, and Amelia.

Murphy's district.—Considerable activity is now being displayed in this district, and favorable results obtained. The principal mines, now productive, are those owned and worked by the Oro Plata Mill and Mining Company. Their mines consist of the Oro Plata, Pay Rock, Red Wing, and White Wing—all in limestone formation. The ore carries gold and silver in sulphurets. In some instances the mineral is galena and zinc blende, and in others gray copper, the concentrations being worth from $7,000 to $10,000 per ton.

There are a number of different veins, varying from 2 to 200 feet in width. The rock, as it comes from the mines, assays from $12 to $200 per ton. These mines have been in operation about two years, yielding upwards of 6,000 tons of rock, the greater portion of which is still on the dumps. The deepest shaft is 300 feet. The work performed aggregates as follows: Depth in shaft, 600 feet; length in tunnels, 1,500 feet, and in levels, 800 feet. The company has kept a 10-stamp water-power mill in operation most of the time in connection with roasting and chlorination works. They are now erecting a large mill.

There are several other mines in the district that have been prospected to a greater or less extent, some of them making very favorable showings. Among them may be mentioned the Collier, Bonanza, and Sunny Side. All these have shown excellent results, though, as yet, but partially opened. The Collier has been in operation about six years, and has produced some exceedingly rich rock. The Shawmut, Morse & Rider, Calaveras, Washington, and Woods mines have, without exception, good prospects.

The Big Tree iron mine is located in this district. This immense deposit of mineral embraces an area of 90 acres, and, when the proper facilities for working are afforded, will prove one of the best and most productive iron mines on the coast. Limestone, for fluxing purposes, and an abundance of wood, are at hand. The ore is brown hematite. The only requisite lacking has been the means of transporting the iron to market, but when the narrow-gauge railroad now building is completed, the iron interests of Calaveras will outrank those of any other county in the State.

The Old Judge is the principal gravel mine. It has a shaft 200 feet deep and several hundred feet of tunnel. It has been worked about two years and paid well. Water for this section is supplied by the Union Water Company. There are 40 miles of ditch, of a capacity of 3,000 inches.

Angels' district.—This is one of the oldest established districts in the county, and operations are now being carried on with more vigor than for ten years past. The principal mine in this district is the Gold Cliff. No report of the product of this mine could be obtained, but it must be large, as the ore is of good quality and the company owning it has just completed a new 20-stamp mill, making 30 stamps in all. The mine is absolutely a cliff of gold-bearing quartz; one of the most singular formations to be met with anywhere in the mining region.

Steckles & Bennett mine, an extension of Gold Cliff, prospects well. The Porter is also a very promising mine. Shaft, 100 feet in depth; machinery now being erected.

Ore from the Black Oak mine, lately crushed, yielded $100 per ton.

The Invincible has a shaft 70 feet deep. Ore yields $10 per ton. The Fletcher, Raspberry, and others are producing well.

At Carson Hill is the celebrated Carson Hill mine, from which upwards of $1,000,000 have been taken. Litigation and other difficulties have conspired to make the mine unproductive, lately.

At Robinson's Ferry some extensive quartz developments have been made, but no report could be obtained from that quarter.

San Andreas district.—The leading mine is the Pioneer Chief or Thorn mine, a very promising property. Shaft, 280 feet deep; level, 200 feet in length; lode, from 1 to 4 feet in width; ore averages $7 per ton; cost of mining and milling, about $4 per ton.

The Donaldson mine is paying well, the ore all being high grade. A 5-stamp mill is now being put upon this mine, it having been previously worked by an arrastra.

Other mines are the Hanby and Gray, Bode, and Thorpe. The latter has a 10-stamp mill.

Copperopolis district.—The copper mines of this once famous district are now idle, although they are all capable of producing rich ore in unlimited quantities. The mines are Union, shaft 600 feet deep; Keystone, shaft 400 feet; Empire, shaft 300 feet; Calaveras, shaft 200 feet, and several others.

The principal quartz mines are the Meritius, which shows good ore for a distance of 110 feet, and pays $12 per ton. Pine Log mine has a shaft 200 feet deep, a 5-stamp mill; and the rock pays $10 per ton. Red Rock mine is paying about $11 per ton. There are several chrome-iron mines in this district, the ore from which assays 60 per cent.

Campo Seco district.—There is an increased activity observable in this district, especially with regard to copper. The principal copper mine is the well-known Campo Seco, a very valuable property. The shaft is 400 feet deep, being supplied with excellent hoisting works. It has lately passed into competent hands and is now being worked successfully. Five hundred tons of ore are now being conveyed to the railroad terminus, for shipment to reduction works. Other copper mines are the Lancha Plana and Satellite.

The leading quartz mine is the Borger; shaft, about 100 feet deep, with fine prospect, but as yet unproductive. Large deposits of iron ore have been discovered in this district, as well as beds of bituminous coal. As yet, however, these minerals are undeveloped.

GRAVEL MINES.

While beds of auriferous gravel are to be found in all parts of the county, by far the larger portion of gravel mining is done within a few miles of Mokelumne Hill, near the northern boundary.

Tunnel ridge, a low cement-capped elevation forming the east boundary of Chili Gulch, is being worked for miles in extent, embracing the most productive gravel mines in the county.

The most prominent hydraulic mine is the Eureka. This mine has two ditches aggregating 17 miles and furnishing a constant supply of

1,000 inches of water. By means of iron pipes a pressure of 200 feet is obtained, precipitating the water against the gravel bank with irresistible force. Many acres of rich gravel have been washed away, and still the process of denudation goes on. The net yield for the last year was about $40,000.

The Bonanza is another large hydraulic mine on Tunnel Ridge. Four hundred inches of water are used under a pressure of 150 feet. The net proceeds of this mine last year was $18,000.

The Mammoth and Penobscot hydraulics on the same ridge are in all respects similar to the Bonanza, and their yield is about the same.

The Duryea hydraulic mine is one of the most extensive and systematically worked in the county. The banks are 100 feet high, the water used having a pressure of 250 feet. A very large area of ground has been washed away, and it is estimated that the mine has produced $500,000.

The Happy Valley Blue Gravel Company's claim contains 100 acres of good ground. A tunnel three-fourths of a mile in length is necessary to its proper working, a commencement upon which has been made. When fairly opened this will be among the great gravel mining properties of the State.

The Green Mountain is one of the most prominent tunnel claims, embracing 3,000 feet in length along the channel. The tunnel is 1,100 feet in length. There is an 8-stamp mill for crushing the gravel. This mine has been profitably worked for many years. The gravel yields about $3 per car load. Cost of mining, &c., about $1 per car load.

The Gleason mine is worked through an incline about 1,400 feet in length. Work is being pushed steadily ahead day and night. An 8-stamp mill crushes the gravel as taken out from the mine. The mine is productive, but the amount is not stated. The Sullivan mine is worked through a tunnel 900 feet in length. Good gravel has recently been struck, and from this time forward the mine will reward the perseverance of its owners.

The Rough Diamond is a profitable drift claim, worked through a tunnel of great length, and is very productive.

The Empire mine has a patented claim of 80 acres, and is a very desirable piece of property. An incline and tunnel has been run 1,000 feet on the channel, disclosing gravel that will pay $5 to the car-load. It has a 10-stamp mill and excellent water-power hoisting-works.

The Contention mine, Gourley & Co., proprietors, is a tunnel claim in Tunnel Ridge. The mine is now productive.

Other gravel claims, of which special mention need not be made, are the What Cheer, Hughes, Le Belle Francois, Concentration, Red Hill, Buckey, Corral Flat, &c.

The Pine Peak, hydraulic, is an extensive claim worked by Cook Brothers. A very large quantity of water is used under a heavy pressure. The claim includes about 100 acres, and a project is mooted to extend the Eureka ditch to it, which would greatly cheapen and facilitate the working of the mine. The Kenner mine, located in Poor Man's Gulch, has a tunnel run 1,100 feet through solid bed-rock. Gravel has not been reached yet, but the breaking through of the tunnel into pay-dirt is looked for soon. Thousands of dollars and years of labor have been expended, as yet, without remuneration.

In the *Cave City* district are two productive gravel claims, but no statement of the product could be obtained.

In *Dogtown* district are several extensive hydraulic and drift claims, prominent among which are the Jupiter, Deep Blue Gravel, Monarch.

and Bully Bully. These mines are all productive when water can be obtained. The Keefer hydraulic is fitted up in fine shape, at a cost of $40,000. The bank is 100 feet high, and 1,000 inches of water can be run at an enormous pressure.

In the *Comanche* district the most prominent claim is Storey & Co.'s. It is hydraulic, has been worked twenty-eight years, has produced $500,000, and is still productive.

At *Poverty Hill* are Rathlaw, Morrell & Co.'s, Garlow & Co.'s, and Cavenora's claim, yielding from $4 to $10 per day to the hand employed.

There are extensive gravel beds in Comanche district that would pay well if water was more abundant.

The Calaveras Water and Mining Company's claim, located near the Jenny Lind, is among the most notable gravel-mining enterprises in the State. The company owns 1,800 acres of ground, of which 640 are composed of free gravel. The company also owns 21 miles of ditches, conveying 1,500 inches of water, which is used for hydraulicking. The water supply is obtained from Salt Spring reservoir, covering 1,500 acres of ground. Thirty hands are employed. Product of the mine not given.

At Railroad Flat are the great hydraulics of Clark & Woodbury, with upwards of 1,000 inches of water, and employ a large number of hands. These mines are very productive, but the yield cannot be stated.

Douglas Flat district.—This is among the oldest and most productive districts in the county. The more prominent mines are the Texas, Mariposa, and Dolly Varden. The three claims last mentioned are deep gravel mines worked through shafts. The Southwestern Tunnel mine lies west of Douglas Flat. This mine paid handsomely in former days, and work has recently been recommenced with good prospects.

Vallecito district.—But few claims are being worked in the vicinity of Vallecito. Arata & Co. are working their mine on Vallecito Flat, which has yielded largely for years. The Red Wheel claim is another property that is enriching its owners.

The Dashaway, Bonney, and Bowling Green claims, embracing 400 acres, are being negotiated for, with a view to running a tunnel more than a mile in length, to work them by hydraulic process. The only quartz mine sufficiently developed to warrant any notice is the New Constitution. It is furnishing considerable ore that pays $10 per ton.

It might be stated that a narrow-gauge railroad is being built through the heart of Calaveras County to connect with the seaboard, which will render its vast timber resources, marble quarries, and coal and iron beds available.

COLUSA COUNTY.

Colusa County lies on the Sacramento River, some 35 miles above Sacramento City, and is one of the largest wheat-growing counties in the State. Its mining interest is very limited, and is confined to Sulphur Creek. It has but one producing mine at present. The Cherry Mining Company at Sulphur Creek, a quartz mine, produced the last year $2,575 in gold.

DEL NORTE COUNTY.

This county lies in the extreme northwest corner of the State, and embraces an area of 3,240 square miles. While it is classed as one of the mining counties, its industries are varied, and the output from the mining section for the year 1882 was quite limited. The principal section in which mining is carried on is in the eastern end of the county, on the Klamath River, above and below the town of Happy Camp. Here are located the chief hydraulic mines of the county, lying chiefly on the banks of the Klamath River. In this section are located the following-named mines:

Bunker Hill (better known as the North End hydraulic), owned by Messrs. Temple & Childs. It is an excellent paying property, and embraces an extensive range of gravel, all of which prospects well.

The next mine, coming up the river towards Happy Camp, is Wingate Hill, also owned and controlled by Mr. Temple. It has paid well, but at present very little work is being done.

The next is the mining property known as the Girder claim, and is owned by Joseph Camp & Co. It is said to be a good paying property, but owing to litigation it is now idle.

The next claim is the Happy Camp hydraulic, situated about one-half mile below the town of that name. It is owned by Horace Gasput, and that gentleman is about to dispose of it to Eastern capitalists. It has the reputation of being one of the best mining properties in Northern California.

Above Happy Camp and proximate thereto are situated two large hydraulic claims—the Del Norte, owned and superintended by S. S. Richardson, and the Muck-a-Muck, owned by Mr. A. Doolittle. Both are remunerative properties.

Next above them is the China Creek property, owned and worked by James Reeves, and is a paying property.

Above these again, and adjoining the Siskiyou County line, are a few small claims that are worked occasionally and with varying success.

There are also a few paying claims on Judson Creek, a small tributary of the Klamath. Among these may be mentioned the Classic Hill, owned by James Camp & Co., and the claim of Huley & Hileman.

There are no developed or working quartz mines in this part of the county. All the claims are hydraulic, and are owned chiefly by large companies or men of means. Quite a number of Chinamen are employed around the mines. The amount of gold taken out by Chinamen in this district on their own account is merely nominal, and probably would not exceed $5,000.

In the western or coast side of the county and situated on Smith River are large hydraulic mines.

The Big Flat gravel mine and the Mountaineer are situated in Big Flat district. On the former more than $200,000 have been expended in bringing water, but no piping has yet been done. It is owned by Messrs. Lane & Paris.

The Mountaineer is owned by a company of miners, who have not yet got their water ditch completed. It is believed that both of these claims are unusually rich.

Also situated on Smith River, below Big Flat, are the Armand and French Hill mines, both hydraulic, and said to be good prospects. They are owned, the former by Messrs. Yates & Co., the latter by Mr. Smart. Situated near Smith River is the Del Norte Quartz Mining Company's property, owned by Judge Murphy and others of the town of Crescent City. It is yet in an embryotic condition, although the company has sunk a shaft and run a tunnel, out of which some very good looking rock has been taken. The owners confidently anticipate a bonanza at no distant day.

In past years near Crescent City the mining in black sand on the beach was quite vigorously prosecuted, and a large amount of gold taken out. This has now, however, about ceased, owing to the increased cost of working the lower strata, on account of the extreme flatness of the country. There are very few Chinese miners in this part of the county, and the amount of gold reported by them is nominal, probably not to exceed $1,000.

In December of 1882 Mr. Samuel Howard, of Happy Camp, in this county, found the second largest nugget of gold ever found in Northern California. It was picked up on the dump of the Classic Hill mine, on Judson's Creek, Merry Gulch. The piece weighs 150¼ ounces, or 12½ pounds, troy weight, and is worth $2,554.25.

EL DORADO COUNTY.

J. W. Marshall, in the year 1848, while in the employ of Captain Sutter, on the South Fork of the American River, in this county, at a place now called Coloma, in digging for a mill-race to supply power for a saw-mill being constructed at that place, picked up the first piece of gold, which excited not only the American people, but the whole civilized world. El Dorado County was the first county sought by the early Argonauts to dig for gold. This county very soon filled up with that class of population. Its surface diggings were extensively worked and soon comparatively exhausted. Gravel diggings exist in the county. The quartz interest is the only interest which is being successfully developed at present.

At Shingle Springs, 10 miles from the county seat, Placerville, the ledge known as the Davidson mine, is claimed by parties to be a good vein, but capital is wanted to develop the same.

The Johnson mine, although from $60,000 to $70,000 have been taken, does not pay now, but the parties have much faith in the mine, and the indications are very favorable.

The Kay & Spong mine is placer, and pays very well when running; the trouble here is that natural water (rain) is wholly depended on to operate this mine.

The Oro Fino is the largest quartz ledge in the neighborhood of Shingle Springs, the ledge being about 30 feet wide, and the ore is of very even grade. The owners claim to have rock enough in sight to last three or four years, and the indications are that the ledge will rather increase than diminish in size. About $40,000 have been spent in developing this bonanza; a mill has been built thereon, and everything connected with the mine is in good shape. This is considered one of the best producing mines of this county, and may prove to be one of the permanent paying quartz mines. The rock shows free gold and sulphurets which assay high.

The M. S. Grainger mine is placer and pays well when water can be obtained to work it.

The Fowler Grainger mine has been sold and is now in the hands of the Whidden Mining Company. The result proves that the mine is good, for they cleaned up 80 ounces after five and a half days' work, or about $200 per day.

The Graham mine is paying well, as is also the Sailor Jack; the latter is owned by a company and is rich, the company having taken out some four or five thousand dollars lately.

The Yuma.—This mine is owned by Claus & Martin Mangels & Company, of San Francisco, and is a large mine, and is working full force now. The report is that it is paying very well. The general verdict of the people in that section is, that the mines, taken altogether, are in better condition and paying better than they have for years past.

Gray's Flat mine is situated 2½ miles north of Shingle Springs. Sinking at a depth of 30 feet they came upon a body of exceedingly rich ore and took out $10,000. They are now down 50 feet. The ore is of high grade, free gold. The ledge at the bottom of the shaft is 2½ feet in width.

Quite recently strikes have been made in the Lyon gold gravel mine at Prospect Flat, 2 miles above, and in the Cedar Springs mine, of enormously rich gold-bearing cement. Both of these mines belong to a Boston company. Although the two mines are but a short distance apart, the gold they produce and the cement in which the gold is found are of a widely different character. The cement from the Lyon mine is clayey and light gray in color; that from the Cedar Springs mine contains more sand and has a reddish tinge. The gold in the former is found in exceedingly fine particles, averaging about the size and generally bearing the shape of cucumber seeds, but ranging from the size of an ordinary pin-head to pieces weighing half an ounce or more. We have inspected chunks of cement from the Lyon mine 8 to 10 inches across in either direction, and where the surface has been made smooth and sleek by contact with bowlders, in which streaks of fine gold, 1 to 3 inches across, may be seen running through the mass.

Chunks of cement have been taken from the Cedar Spring mine, from pieces of which, about the size of a man's hand and weighing about a pound, coarse gold to the amount of $12 or $15 has been picked out with the point of a knife-blade. It is not considered extravagant to estimate that there is cement being taken from either of these mines that will yield $20 a pound.

In the vicinity of Placerville there are but few mines working at present, as particular causes are being assigned why more are not in operation.. Now and then large strikes are made, which give new energy to owners and prospectors, who strike out again in the hope of meeting success.

Blakeley's mine is situated about 6 miles easterly from Placerville, near the "Old Corson road," in what is known as Johnson's Cañon. This mine has proved itself to be very rich in gold-bearing gravel. The process of working it is very simple, being placer hydraulic mining, the gravel washes very easily, and the fall is gradual; on account of the soft earth and plenty of water but little help is required. The bank is not very high, the best part of the claim being in what was once one of the most fertile meadows to be found, and before mining was carried on this spot was in litigation between rancher and miner before the land department, the question being as to the value of the ground for either mining or farming purposes.

In this behalf a good deal of prospecting was done to determine the character of the land. The result was that the land was declared to be worth more for agricultural than mining purposes. The miner, then, having unlimited confidence in the land, though worked as before stated, bought the place and in a short time proved, by taking out the genuine article, the rich character of the land. Some very fine and large nuggets have been taken out by the owners of the mine, and were placed on exhibition at the county and State fairs, respectively. It would be hard to estimate the amount taken out of said mine, but the people who are acquainted with the mine think that no less than $200,000 have been taken out. A. J. Blakeley is the owner and manager of this mine, and has great confidence in its lasting production. If it keeps on as good as it has heretofore proved itself to be, then it will be one of the permanent mines of El Dorado County. The water used thereon is supplied by the El Dorado Water and Deep Gravel Mining Company, who have built a large reservoir near the mine to guard against temporary failure of their ditches.

Not far from this is the old Saint Louis quartz mine, which has paid very well, but at present it lies idle. It has been reported that the works were lately consumed by fire and have not been rebuilt. This mine is yet considered to be worth holding and looking after, and the probabilities point that it will be started in the near future.

Nearer town, and on the same road, is to be found the Oak Grove gravel mine, formerly owned and worked by an English company who took out a large amount of gold while the pay-streak lasted, but they abandoned the mine as soon as the bed then being worked gave out. Lesser capitalists have attempted to run this once famous mine, but have quit after a short trial. Mines in the neighborhood being now hydraulicked, and thought to be on the same channel, are yielding large returns, namely, the Lowes, Sexton, Ward, and other smaller claims. It would be no surprise to see the Oak Grove start again, and it would be a good thing for the neighboring town of Smith's Flat, where many men are now living who depend upon this means of employment for a livelihood for themselves and families.

Just over the hill, and in what is called the Chile Ravine country, there are several placer and quartz mines which are worked off and on during the wet seasons.

The Ames mine is working, but the yield is not large. More could be expected from this mine, for it joins the face of the Cedar Springs mine. It is thought the channel has not yet been reached in the Ames. By good management a good paying property can be developed. Not long ago Captain Ames, while panning out pay dirt from his mine, found a large and handsome diamond, without defect and remarkably clear. Of course, no exact estimate of its value can be made until it shall have been dressed. Several years ago a diamond was found on the same claim.

In the same vicinity Mr. William Montgomery, while searching in the black sand from his claim, found a diamond estimated to be worth in the rough about $80.

The Ringgold is the next in line, and promises to become a very substantial quartz mine. It is being worked constantly, and is well developed. The mine is owned by a London company (English). No estimate can be made of the yield of this mine but that it is satisfactory to the owners. This same company owns the Placerville quartz mine, formerly called the Pacific, which is one of the best paying quartz mines in the district. Here can be found all the latest machinery for air, hoisting, crushing, concentrating, &c., which is to be had for money, and everything is convenient. It is, taken all in all, a model mine, all the appointments being complete.

The rock from this mine is of very peculiar color, at times green, then brown, and then variegated. Free gold is visible in this rock, and is somewhat scaly. The mill is some distance from the hoisting works, and the ore is taken to the mill by means of cable cars. This mine is well worth inspecting by any one who is interested in mining, to behold the great improvements that have been made in extracting and milling ores.

Adjoining this is the Rose quartz mine, on another ledge, which, though it has been paying for some time, has been closed for lack of funds. When it will be started again is a question which cannot now be answered.

At the Bob Red mine, at Spanish Flat, two shafts have been sunk, respectively 50 and 60 feet, and 40 feet apart, in which very rich rock was found. Two days' work with a hand mortar produced 22 pounds of clean gold. This almost exceeds the finds in the palmy days of 1849.

Dresback mine is situated at Grizzly Flat, some 28 miles north from Placerville, the county seat of El Dorado County, in a rich mining district, and is not producing at present. It is, however, being thoroughly developed; there are four shafts being sunk, and a tunnel is being run on the lode or vein, which latter is showing a fine vein of high grade and free milling ore. This mine embraces 4,200 feet on the vein; good milling ore has been traced a distance of 1,000 feet, at a depth of from 60 to 100 feet. This company intend to erect a quartz mill at once and commence crushing ore.

The Mount Pleasant mine at Grizzly Flat is the largest bullion-producing mine in El Dorado County. At 400 feet levels have been run upon the ledge to the northward and southward, and are still being extended, the ledge widening in both directions, the ore maintaining all of its peculiar characteristics. The ledge which at the bottom of the shaft was 3 and 4 feet thick, extends to the northward until at a distance of 80 feet from the shaft it measures 6 feet; to the southward, at a distance of a little over 100 feet from the shaft, it has swelled to the dimension of fully 13 feet, widening between the top and bottom of the tunnel at a rate which, if continued to the 500-foot level, would give an ore body of 50 to 60 feet in width at that depth. In all of this ore there is an extraordinary proportion of rich sulphurets, giving it a very brilliant appearance, and the whole of it may be classed as high-grade ore. The outlook at Mount Pleasant gives every assurance of a profitable output during the current year, with no room to doubt a permanently prosperous future.

The Arctic mine at Grizzly Flat has been thoroughly opened, and is now producing bullion; this also bids fair to become a paying property.

The Mount Hope mine, near Grizzly Flat, has just cleaned up after a fifteen days' run, producing 16½ pounds of amalgam, of the value of $3,150. This is the third clean up since the new 10-stamp mill has been erected. This mine is paying about $5,000 per month above all expenses.

At Spanish Dry Diggings the Gilbert & Davis, the Hues & Co., the Walker, Pite & Co., are successfully mined with promising results.

At the Rogers mine, in Putty Ravine, one mile south of Gold Hill, a pocket was struck which paid $2,500 in two hours' work.

The Pleasant Valley mine has just completed a 10-stamp mill, commodious in all its appliances. Nineteen men are employed. The mine and mill are in successful operation.

Messrs. Armstrong & Baldwin's mine, at Rich Gulch, yielded in one month $3,000, and the succeeding month $10,000 more. This was done by two men's labor. These men are highly deserving of success, which has been won through the most determined and commendable enterprise.

A prosperous mine, the Gopher, has not been compelled to shut down for a moment, on account of the severity of the weather for the past six weeks, though the mill has been compelled to lie idle two or three days during that time, in consequence of the ditch being clogged with snow. This mine continues to develop splendidly, and 10 more stamps will soon be ready to assist in crushing the surplus ore now accumulating and give employment to a few more men. Forty stamps could easily be supplied with ore now, and of a character that would permit a monthly dividend of not less than $20,000; and we believe they will be added soon.

Greenwood.—At this old mining camp arrangements have been consummated, by which several of our leading mines will resume operations early in the new year. River mining is closed for the season, with the prospect of being resumed next season with renewed vigor.

Mr. Zentgraf has just completed a 5-stamp mill on his quartz-mining property at Wild Goose Flat. Mr. Zentgraf has a very valuable quartz lode, which he has prospected in a thorough manner with most promising results, and has built the mill for the purpose of more efficiently testing the ore, intending to enlarge its capacity as he progresses in his work. The appearance of the ore now on the dump justifies the opinion that this will become requisite at a very early day. Mr. Zentgraf is to be complimented on the careful manner in which he has prospected this mining property, which has every advantage of locality and surroundings to economize working, and gives every indication of proving one of the finest quartz-mining properties in this county.

At Rich Gulch, near Georgetown, $6,000 was taken out by hand, mortar, and pan from vein rock, by Mr. Thomas Z. Armstrong, at an expense of $250.

The Argonaut mine, near Georgetown, is looking well; the 10-stamp mill is running day and night successfully.

Near Georgetown is the Cincinnati mine, which has a shaft down 100 feet in depth; ledge large and well defined and free gold.

Next to the Cincinnati is situated the Gold Deposit mine; it has a 10-stamp mill, and shaft sunk 100 feet, and has extracted rich ore.

The Milton mine at Mill City, on the North Fork of the Cosumnes River; (it has taken its name from the number of mills just erected there); the Lyons mill, of 10 stamps; the Flag Staff, a 10-stamp mill, also the Milton mine, an 8-stamp mill, and the Ballard, are crushing rock from the mines in the immediate vicinity.

At Volcanoville, near Georgetown, an immense extent of auriferous gravel, capped with cement, which is only partially prospected, and which is believed to contain untold wealth, is being prospected extensively, and is supposed to be the bed of an ancient river.

The Alhambra mine, in Kelsey Township, sent to Professor Price, of San Francisco, 450 pounds of ore to be tested; the returns show a yield of $2,300, or a fraction over $5 per pound or $10,000 per ton.

FRESNO COUNTY.

Fresno County extends from the Coast Range on the west to the Sierras on the east; it is a large agricultural county. The mines heretofore have attracted but little attention until the last year or two, and by recent developments are coming into notice; they are situated in the foot-hills of the Sierras, near Fresno Flats.

At the town of Gertrude is situated the Surprise mine, owned by McDonald Bros.; it is being steadily developed; the shaft is sunk 125 feet, and has struck a fine body of milling ore.

At the same camp is the Red River mine, owned by Slommer, Barker & Co. The shaft is down 40 feet; at that depth a ledge of rich quartz was struck, 2½ feet in width, and as greater depth is reached it increases in width.

The Antelope joins the Red River, and has a shaft down 70 feet in good pay rock.

The King's Gulch mine joins the Antelope; they have developed a ledge of 7 feet in width of first-class ore.

The Enterprise Mine mill at this camp was shut down in October, 1882, on account of the water supply giving out; the mill is being repaired and put in proper order for crushing the season's work. The Enterprise is the best-developed mine in Fresno County, having four tunnels, two incline shafts, levels, cross-cuts, &c, and paid the owners largely last year, and bids fair to continue to do so for some time to come.

On Big Dry Creek, 16 miles northeast of Fresno City, is situated the Doak & Wyatt mine. This mine has been in operation a year; they have sunk a shaft 100 feet and struck the ledge, which is from 8 inches to 4 feet in width. The ore yields in free gold from $125 to $150 per ton, high-grade gold, assaying $20 per ounce. They are running a tunnel to strike the ledge; the tunnel is in the mountain 190 feet, and has not yet struck the ledge. The ore has been worked by arrastras at a cost of $20 per ton. This mine has on its dump about 2,000 tons of low-grade ore awaiting the erection of a mill to crush it.

The Anderson & Doak mine is a continuation of the Doak & Wyatt; there are four shafts on this mine; one 130 feet, one 170 feet, 150 and 140 feet. They are running a tunnel under this lode, which they intend to connect by a tramway with a new mill which is being erected, by which they will be able to mine and mill this rock for $4 per ton. The mill being erected has ten stamps of 750 pounds each; three concentrators with all the modern improvements attached, run by steam, employ 17 men. Several mines are being prospected in this vicinity with a look of success.

Mount Goddard is 90 miles northeast of this place, and has running through it what is called the slate belt; it has three lodes running through it, one of red porphyry 150 feet in width, and two other lodes bearing gold, silver, and copper.

Back of Mount Goddard is a very rugged country, lying between the San Joaquin and King's Rivers. It is 130 miles from river to river, and about 6 miles wide, of slate and porphyry, all seamed with quartz lodes very little prospected.

De Soto group of mines.—This group consists of the De Soto and River View lodes, lying under the Cathedral Peaks, on the headwaters of the San Joaquin River. The ores are sulphureted, bearing silver, and will average at least $40 per ton. Careful examination and measurement show the ledges to be 50 feet wide from wall to wall, no gangue intervening. The facilities for reduction are second to none, there being dense forests of timber on the mines; water is easily obtained from the high falls on the river above the lode. These mines have been opened at four different points along its trend, and show vast bodies of mineral. The field-rock is a porphyry on the foot and a talcose slate on the hanging wall, which is so characteristic of a true fissure vein. Negotiations are now on foot that will probably result in the disposition of this large property to some Chicago capitalists in the early spring.

HUMBOLDT COUNTY.

This county is not what might be called a mining county proper, although considerable mining has been done there for many years past. There are several hydraulic mines in the county, a few placer, and the sand washing at Gold Bluff, which produces large quantities of the precious metal. The following are the principal hydraulic mines in the county, and the production of each for the year 1882:

At Orleans Bar:	
Big Bar	$7,153
Markuson and Knudson	21,699
Bristol	2,100
Savorom	16,500
Red Cap Bar	4,700
Pearch	2,700
Brown's	5,000
China Flat	600
French Bar	200
	60,652

The Thompson Bar mining claim is a placer mine which produced about $2,000 last year.

Gold Bluff.—In the year 1853 gold was first discovered on the beach at the mouth of Rogue River by a party of men who came up from Crescent City in a whale-boat. Miners rushed in from Crescent City, Port Orford, and Randolph, and in a short time the hitherto unknown shores were dotted with little villages of log cabins, where the miners congregated for safety, as the country was swarming with Indians who might have annihilated them had they been less discreet. The mines extended along the beach for 12 miles on each side of the river, and proved to be the most important beach mines ever found, and have well merited the name of Gold Beach. A few years later great excitement was caused by the discovery of gold in the sands of the ocean beach, near the mouth of the Klamath River, in this county. Many methods for successfully working this sand have been tried, until finally a systematic course has been adopted which produces very satisfactory returns.

The primitive method of saving this gold, which is inconceivably finer than the beach sand, was by rough sluices and blankets, and drops in which were placed from 50 to 100 pounds of quicksilver. But these were soon superseded by galvanized-iron plates, the preparation and use of which were accidentally discovered by a miner at Cape Blanco. The copper plates by constant use became brittle and broken, and were thrown away by the wholesale for several years, when it was discovered that they were worth several dollars per pound for the gold that had worked into them. The sand is now brought up from the beach on the backs of mules, when it is washed in sluices, small streams of water having been brought in for the purpose. For saving the gold only copper-silver plates are used in the sluices, which are usually run with a light head of water.

The following table shows the production of gold in this county for the calendar year 1882:

Location.	Class of mining.	Amount.
Orleans Bar	Hydraulic	$60,652 00
Gold Bluff	Sluice	36,700 00
Total		97,352 00

INYO COUNTY.

This county is situated in the southwestern part of the State, with Mono County on the north and San Bernardino on the south and the State of Nevada on the east. The country is rough and mountainous, with but very little agricultural land. A large portion lies east of the Sierra Nevada Range of mountains, which portion is composed of rough, steep mountains, barren of soil or vegetation, but nearly all mineralized. The northern portion of the county may be said to be split or divided by Owens Valley and River, of which the latter runs south from Mono County through the valley to Owens Lake. On the west side of the river is the Sierra Nevada Range, on the east is the Inyo Range. There is no fertile land except that found along this river; but like a large portion of San Bernardino is made up of rough, barren mountains interspersed with valleys and plains that are sterile and desert like. In this county is the famous Death Valley, and the sink of the Armagosa River, which is 150 feet below the level of the sea. There is a vast amount of mineral deposited in the mountains all over this large tract of territory, but as a rule it is badly broken up and scattered, no general system of veins running through the country, yet there are many good mines now being profitably worked.

The Inyo Range.—The following description is taken from the Chronicle of December, 1882:

"The mountains of Inyo are greatly diversified, upheaved in mass, unfolded in rolling hills, outlined in ranges. Mass or range, they are of the same formation, built at the same periods by the same forces, except always the Sierras, which do not belong to this region other than to form the western boundary of it, a mighty wall separating it from the great inland valleys. Great height, features of power and majesty, elements of splendid mountain architecture are often present, making them the grand framework of bold and picturesque scenery. The volcanic origin of these mountains is evidenced by craters whose scarred rims are yet white with the ashes of dead fires. The Armagosa, Argus, and Telescope ranges are the most imposing of these mountains. The Inyos extend along the Owens Lake Valley, form its eastern rim, and the White Mountains in Nevada southward, for a distance of 150 miles, parallel with the Sierras, from which they maintain an average distance of about 12 miles. They rise and fall in waving lines, gradually ascending until their loftiest summit is reached, opposite Mount Whitney, where they tower 10,000 feet above the sea and over 4,000 feet above the valley.

"Though seeming to scorn connection with the Sierras, they have sent out to their base an offshoot of low hills called the 'Alabamas,' a line of skirmishers flung across the river and set as a defense, challenging the encroachment of the Sierras upon the lowlands below—a curious group of hills rising like volcanic bubbles along the Sierras' sloping base. The rock formations of the Inyo range, having for their fundamental bed the eternal granite, are divided into limestone, slate, and porphyry, strata of which cut the surface in great parallels or hold undisputed possession of vast districts. The warp and woof of the Inyo range is mineral; veins of silver and gold, pure or mixed with other metals, are woven into its formations like threads into a fabric. Its deposits run through all characters and grades from the native metals to the purely chemical deposits. These are distributed with wonderful prodigality. Like all mining regions the range has been divided into districts, which, though bounded by imaginary lines, have a character and nature peculiar to themselves. Following the range northward these districts are divided as follows: Cerro Gordo, Russ, Beveridge, Union, Waucoba, Big Pine, Deep Spring, Bishop Creek, Piute, Sylvania, Montgomery, and Indian Queen.

"In Cerro Gordo, the southernmost district lying abreast of the lake, vast dikes of limestone, slate, and syenite cleave the rolling hills, into which the lower mountains unfold, alternating as they ascend towards the central mass, until the upper altitude is held by a vast limestone formation. In this, at the town of Cerro Gordo, 8,000 feet above the sea and 4,000 feet above the lake, and lying at the base of the Cerro Gordo peak, was found the most extensive lead and silver deposits yet developed in the entire range, or in the State of California. From them have been extracted $15,000,000. The extraction of ore from these deposits is at the present time suspended, though undoubtedly millions yet remain still to be uncovered, as the development of these deposits are of the most superficial character. This district is known most widely for its product of the base metals, from the fact that the greatest output of bullion has been from base ores. Though lead has heretofore been the leading metal, developments now made indicate a bright future for the finer minerals. The purely silver ores are divided mainly into the chlorides and sulphides, specimens of which are exceedingly beautiful, glowing with the tint of summer flowers. Over the entire surface of this district are found veins and bunches of ore, rich, but in most instances of limited extent, as they are but the overflow (or floats) of mother lodes situated higher up or deeper down, from which the surface deposits have been torn by the jar of earthquakes or the fury of tempests.

"The frequent discovery of these floats and the disappointment that comes with their development has done much to form the hasty opinion that the mineral deposits of this range lack extent and permanence. A careful study of the surface here indicates beyond question that it has been subjected to the force and power of mighty convulsions, whose jar and crash have disturbed the ancient condition and repose of things. Deep mining and exploration of lower strata alone can determine the permanence and extent of the minerals in this range. Although this district presents a most promising field, the scarcity of water, distance from fuel, the altitude and extreme grade from the valley greatly militate against mining operations and make the cost of extraction and reduction so great that only ores of the highest grade are regarded as valuable. At the present time thousands of tons of ore, averaging from $25 to $30 per ton, lying on dumps or exposed in stopes, are regarded as without value, for the reason that the amount they carry is barely sufficient for their extraction and reduction. Hundreds of thousands of dollars may be needed to overcome these defects and bring about more economical processes, but once established, this district, from present indications, must yield great wealth. Litigation, that foe of progress in mining, has also had much to do with the present suspension of operations at Cerro Gordo. The clash of rival interests cooled the furnace fires, closed the tunnel doors, silenced the music of pick and hammer, and changed an active, productive town into a deserted village. This state of affairs cannot long continue, for the value of properties here has been demonstrated and the resumption of work must soon take place.

"The district lying to the north, and known as Beveridge, is one of the most remarkable mining regions in the world. It has features common to no other part of the range. The varicolored limestones which enter so largely into the structure of the range in Cerro Gordo, and which there tower in cliff, precipice, and summit, are here beaten down from the occupation of upper slopes, and give place to granite. The limestones in this district form the flanks of the mountains, and do not, except in rare instances, rise in height above 4,000 feet, while the granite towers to over 10,000 feet, and forms the body and breadth of the higher altitudes and slopes. It does so, however, not without contest, for at several points are seen mighty peaks of lime that lift themselves toward the sun. Piled in rugged masses, heaped in wild confusion, building mighty ridges of solid rock, and descending into deep cañons, this granite formation, makes the most precipitous and rugged mining country ever discovered. The mineral of this district is gold. The lead, silver, copper, and various rare and peculiar metals found in other parts of the range are entirely absent in this granite formation, though they are met with in the bordering limestone. The ledges of quartz are exceedingly numerous, each ridge and cañon side being pierced by them. In many instances, though not of great size, they are of exceeding richness. The number of such already discovered exceeds those of perhaps any other district on the coast.

"If future operations shall trace these gold veins to the mountain's heart, giving them scope and permanency, this district will become one of the most wonderful gold-producting regions ever known. Although sufficient has been discovered to attract interest and attention, the roughness of the country has retarded development and prevented extensive operations. No part of the district is penetrated by wagon roads. Rocky trails alone, clinging in places to the face of tremendous cliffs, and overhanging giddy depths barely wide enough to receive the feet of the patient mule and burro, lead into this mountain-fastness. As a result, but a single five-stamp mill has been erected in the entire district, and that with infinite toil was packed in sections by mules over the lofty summit and down into the depths of a terrible cañon, and was planted between frowning battlements of overhanging rock, where it stands to-day a monument of rare faith and energy. An entire year was exhausted in severe and steady labor before the stamps were ready for crushing. This mill, though running for a part of the time only for the last two years, has produced several hundred thousand dollars, and this almost wholly from a single mine, still in operation.

"The mining population here is almost entirely Mexican. They own almost all the ledges of the district. The Mexican system of mining, crude and simple and working for immediate results, has done nothing to settle the great question as to the extent and permanence of these mineral deposits. To systematic, continued, and patient development and prospecting the average Mexican is a stranger. In several cañons and along streams of water they have erected a number of rude arrastras, with which they occasionally and spasmodically reduce the richest ores they crevice from the pay streaks of adjoining ledges, and the fact that they frequently have large clean-ups by so rude a process indicates a marvelous richness of ore. On the western slope of the mountains, rising from the level of Owens River Valley and stretching to the summit where they join the western boundary of Beveridge, are the ancient districts of Russ and Union, the seat of some of the earliest mining done in the first years of this country's occupation. Veins of precious and base metals of greater or less extent and of considerable number were here discovered and much capital invested in their development. After repeated efforts these veins either proved limited or carried ore of a grade too low for profitable working at the prices then ruling for labor and material. Several large veins of a low grade of ore are here situated, which in the near future, with cheap and extensive processes and labor, will become producers of large quantities of bullion.

"The mining ventures at Chrysopolis, San Carlos, and Mazourka Cañon are historical and woven into the early history of this section. Northward the Inyos spread into a mass of milder forms and open into a region less marked with the aspect of desert mountains. The savage ruggedness of Beveridge softens into broad and rolling uplands redeemed by forests of pine. Here, and reaching to the White Mountains, are situated the remaining districts heretofore mentioned, where the base and precious ores are found in quantities sufficient to make these districts the arena of considerable mining enterprises. In Waucoba, the first district north of Beveridge, the high-grade silver-bearing lead ores predominate and in instances give promise of permanency and richness. Streams of water, forests of pine, deposits of soda, salt, iron, and lime are near at hand for the process of reduction, which will reduce the cost of mining to the lowest figures.

"Standing upon the summit of the eastern slope and looking towards the east, but down, down, until the senses swim with the awful depth and distance, is seen Saline Valley, stretching along the base of these mountains, a great basin, a desert valley, rimmed by volcanic hills, its wastes of billowy sand, its sloping dry washes of rock and bowlder, its shining patches of soda and salt blazing under the burning sky. It is a desolate, dreary region, its face of barrenness relieved only by the clusters of mesquite seen here and there. As viewed from these mountains it presents as clear a vision of desolation as could be well conceived. It covers nearly 200,000 acres of sterile land. I mention it in this connection because it is related to the mineral deposits of the Inyo range, in that its levels, where not buried under sand and rocks washed and shaken into it by generations of earthquakes and waterspouts, are vast deposits of almost pure soda and salt many feet in depth, the product of the lime formations of the Inyos.

"Thousands of acres of soda have been located, and in one place a mine of the purest salt, covering over a thousand acres of unknown depth, has been located. As seen from the adjacent mountains, it shines in the sun with a fierce glare, and is clearly visible for over fifty miles. Enough salt is here already prepared for the markets of the world, and each year adds to the already wonderful accumulation. The only question of its utility is one of cheap transportation. The soda fields here will also be of great value, as they can furnish fertilizing material to redeem a State from sterility. Much attention is now given by farmers in the East to soda as a fertilizer. Something will be needed in the future to redeem our lands from the burdens now imposed by our prodigality. The field for investment of capital in this region is vast, and the purely commercial interests will keep pace with, if they do not exceed, the product of the precious metals. The future of this country must be brilliant."

The Kearsarge mine, situated on Kearsarge Mountain, recently struck a fine vein of ore in sinking in their tunnel, which assays showed to be first-class ore, carrying both gold and silver. Other mines in this district are improving, and the outlook for the Kearsarge is promising. This mountain is covered with a net-work of mineral veins and ledges, and some of them show ore of extraordinary richness. The general character of the ores of the district is sulphide of silver contained in a gangue of quartz and porphyry. The average value of the gold in the various mines is from $19 to $58 per ton, and of silver from $25 to $72 per ton. Wood and timber are abundant in this district as well as fine water-power for milling its ores.

The Palma mine, which is located near Cerro Gordo, has opened out a compact ledge from 3 to 5 feet in width, showing some splendid ore, giving assays as high as $1,127 per ton. The rock is being crushed at the Hawley mill at Owens Lake.

The Keynote mine, situated 10 miles east of Lone Pine, has a 5-stamp mill at work, together with arrastras, and has produced in the last eight months $152,740, gold. The average yield per ton was $94.42. The rock is packed on mules from the mine to the mill.

In Mazurka Cañon, opposite Independence, are rich mines of argentiferous lead, yielding 40 per cent. of lead and 60 per cent. of silver.

The Ignacio mine, west of Buena Vista, is said to carry $100 per ton in gold and silver.

The Van Epps and Borden mine, which is located in the White Mountains, northwest of Bishop Creek, at a depth of 100 feet shows a large and rich ledge, and looks like developing into a first-class mine.

The "78" mine, owned by Berry & Co., on the east side of Cottonwood Creek, is being actively developed, and the company are erecting a 5-stamp mill to work free ores from their mine.

In the Newark mine, on the 300-foot level of the north drift, ore of high grade has been struck. The old stopes are yielding the usual amount of ore. The new prospect drift is in 78 feet, showing carbonate in the face.

In the *Wild Rose district* an immense mineral ledge has been struck, 81 feet in width, and assaying 60 ounces per ton in silver. A silver mill is to be erected in that district immediately.

The Defiance mine, located near Independence, has lately encountered a new body of ore on their 300-foot level, north drift, which assays 101 ounces per ton of silver. It is intended to start furnaces on this ore immediately.

In the Phœnix mine the main incline has been sunk 60 feet deeper, making a total depth of 240 feet, at which point the ledge has been cross-cut north and south and drift started.

Panamint district.—Work is being vigorously prosecuted in this district by the Inyo Consolidated Mining Company of New York. This company, having purchased the mill and several valuable locations in this district, about eighteen months ago, commenced work in a systematic manner; since which time their efforts have met with wonderful success. The mill (the only one in the district) is a very complete one in all its appointments, and is required to do considerable custom work. It has been the policy of the company to make the production from the mines develop the same, and at the same time pay small dividends, which has been done. While this has been going on new locations have been secured, large quantities of supplies purchased, and extensive and valuable additions and repairs made to the mill. The production of the mines and mill of the company for the past year was about $60,000.

In addition to the above-mentioned mines, there are a large number of mines scattered over the county, some of which are paying, others being prospected with promising results. The following may be mentioned: Paddy Jack at Cerro Gordo, Figuaro and Ochoa, Laura, Los Angeles, Hyppolite Galeron, Ygnacio, Freeborn, Modoc, Hersch, Wyandotte, &c.

KERN COUNTY.

This county is located in the southern part of the State, between the counties of Tulare, Los Angeles, San Bernardino, and San Luis Obispo. The county, although large, is not what might be called a rich county. The agricultural interest has received quite an impetus within the last few years, owing to the great irrigation works of Messrs. Haggin & Carr, whereby the waters of Kern River have been taken out and distributed over thousands of acres, rendering them very productive. The mining interest is not large, although quite a number of (mostly small) mills are constantly at work. A large portion of the county is rough and mountainous, stretching westward into the Sierras, and containing great lodes of gold-bearing quartz, but generally of very low grade; in fact, much of it too low to pay for working.

Considerable prospecting is being done by that hardy class of miners who are constantly at work blasting and picking, hoping and expecting to make a "strike." In fact, such is the case along the entire western slope of the Sierras from Del Norte to San Diego, whose mountain sides are covered with auriferous earth and gold-bearing quartz.

One of the principal mines in this county is the Big Blue at Kernville. The mine produces large quantities of low-grade ore; the mill, containing 80 stamps, is kept busy, crushing about 120 tons daily, and employs 135 men. This mine has been worked for sixteen years, and yields about $140,000 per annum.

The *Piru district* takes its name from Piru Creek, which runs through it in a southerly direction, carrying, according to the season, from 100 to 1,000 inches of water, and has placer diggings along its banks that have been profitably worked. It is about 25 miles in width by 50 in length, and is a strongly marked mineral belt, containing mineral veins of almost every kind, such as gold, silver, copper, lead, tin, iron, bismuth, antimony, and coal, with strong indications of coal oil. It is abundantly supplied with timber of all kinds, water and grass. It seems to have never attracted the attention of that class of men who get up booms in mining camps. Those who frequent it are poor men, who go there to make a raise, working the rich gold quartz they find in arrastras.

The district is partly in Ventura County, and the part around which the principal interest centers and the work is mainly done is distant 55 miles from Bakersfield. The principal lode is called the Fraser mine. During the time it was worked, a period of eight years, until operations ceased on the 31st of October, 1879, because of litigation arising from disputed ownership, it is believed to have yielded about $1,000,000 in gold. The difficulty is now said to be on the eve of settlement, and it will be worked by more improved methods and on a larger scale than heretofore. The vein varies from 2 to 16 feet in width, and will average 8 feet. The ore contains a small percentage of silver, which seems to increase with depth. At the depth of 250 feet it amounts to $6 per ton, while there was only a trace on the surface. The ore contains iron and other sulphurets that assay from $300 to $3,500 per ton. They are all saved, but there is no means of treating them at the mine. The yield in free gold is from $15 to $25 per ton.

There are many other claims in the vicinity that are successfully worked, yielding from $500 to $3,500 yearly by the arrastra process. One of these, the Castac, a small, rich lode, has yielded about $15,000.

Some of the most valuable lodes cannot be worked by the free-milling process because they contain lead, and therefore lie idle for the present.

One of these, the Mountain Chief, a large, well-defined vein, gives an average working test of $31 in gold and $40 in silver per ton. The ore is also charged with rich sulphurets.

Probably one of the most valuable lodes in the district, if it were in some other place, is a vein of magnetic iron, 50 feet in width, containing 52 per cent. of this useful metal.

Following will be found the number of mills, where located, number of stamps, and product of bullion for the year 1882:

District.	Mills.	No. of stamps.	Yield.	Placer yield.	Total.	Remarks.
Sageland	1	10	$6, 700	$1, 000	$7, 700	Custom mill.
Pah-Ute	3	28	13, 000	....	13, 000	Do
Claraville	0	....	7, 500	800	8, 300	Just burned down.
Washington	1	10	5, 500	5, 000	10, 500	And arrastras.
Kernville	1	80	138, 000	....	138, 000	Company and tribute work.
Bull Run	1	20	10, 500	....	10, 500	Do.
Long Tom	1	10	41, 000	....	41, 000	Lease
Tom Lane	1	10	16, 500	....	16, 500	Tribute work.
Greenhorn	0	....	5. 000	3, 000	8, 000	
Agua Caliente	1	5	3. 800	600	4, 400	
Havilah	4	50	22, 000	....	22, 000	
Kelson Valley	0	....	4, 200	....	4, 200	
Erskine Creek	1	10	3, 000	....	3. 000	Idle.
Little Caliente	1	5	1, 000	....	1, 000	Do.
			277, 700	10, 400	288, 100	

The Big Indian mine in Pah-Ute district is down to a depth of 300 feet and has 300 feet of levels run. It has been worked about two years, and the ore yields from $5 to $25 per ton.

The Williams mine at Claraville, which is opened by a tunnel 90 feet in length, has been worked two years and yields about $25 per ton.

The Baldwin mine, in this district, is opened to a depth of 150 feet, and the ore yields $20 per ton.

The Big Blue at Kernville includes the mines Nellie Dent, Lady Belle, Bull Run, Beauregard, and Big Blue. The ore from these various claims, which are all under one management, varies from $5 to $300 per ton. A tunnel, 800 feet in length, drains all these mines to their present depth; another tunnel, 2,000 feet in length, is being run to drain them 100 feet deeper than at present, and as good rock has been left in all the chutes at present water level, fine promise exists for the future. The mill has 16 Hendy concentrators, 5 excelsior pans, and 3 10-foot settlers. The 160-foot level on the Big Blue has kept 40 stamps running regularly for the past eight years, the ledge being 200 feet in width from wall to wall.

LASSEN COUNTY.

Lassen County is situated in the northeastern part of the State of California, on the eastern slope of the Sierras, and bounded on the east by the State of Nevada.

The only mining being done in this county successfully is at Hayden Hill, 40 miles north of Susanville, the county seat. The only mine taking out bullion and reporting to this office for the year ending December 31, 1882, is the Juniper mine, which has produced a large amount of both gold and silver bullion. This district, from its isolated and high altitude lying out of the direct line of travel, has not been as thoroughly prospected as the other mining counties of the State have been.

Charles E. Fairbanks has described the geology of this district in the Adin Argus, as follows:

"To the resident and many visiting Hayden Hill its structure is regarded as peculiar. While I consider it anomalous, and its special characteristics confined to that district, yet the general formation is distinguished by its resemblance to that of the Potosi mine, in Buenos Ayres, which occurs in a mountain of argillaceous shale and argillaceous porphyry, which has produced in silver $1,300,000,000. Also the next largest, the Guauaxuato, which intersects principally argillaceous shales.

"Hayden Hill is situated in Lassen County, 15 miles from Adin, in Modoc County, and is about that distance from the south line of Modoc County, with good wagon-roads to the top of the mountain. In form it is egg-shaped, somewhat elongated, with outlying benches, particularly on the northern and eastern sides. The mountain is isolated, lying about due east and west. The western and smaller end is appropriately embellished by the pet of the district—the Juniper—with its rich fissures of auriferous deposits, reaching sometimes as high as $20 to the pound of siliceous gravel.

"The hill proper is an upheaval of argillaceous slates and argillaceous porphyry. These clays are in a complete brecciated condition of varying hardness, from the extremely hard, compacted blue slate to the soft, plastic clay. Alum shale, containing pyrites, is also met with, and a friable quality of agalmatolite—a vast variety of colors and shades—lending a peculiar beauty to the conglomerates.

"The porphyritic is much more finely brecciated. These two classes of rock are usually found as opposing walls in the trend of the best defined fissures, which have a northeasterly course, with numerous lesser fissures in all directions.

"The gangue is siliceous gravel—quartz in masses or nodules—clearly showing infiltrated formation. Unmistakable evidences of springs, called 'blow-outs,' show the probable source of the silicates and flour gold. The many rich streaks, with a nearly even distribution of gold through the major portion of gangue matter, are plain examples of nature's process here. Specimens of sheet quartz crystals are frequent, and all the quartz is in detached masses. Varieties of pure white and deep red spongy quartz are found. But little of this quartz carries gold, although the Golden Eagle mine is said to have taken out of its earliest workings some 50 tons, which netted $80 to the ton; and again, the Juniper has a small quantity of $10 to $20 rock. I have seen but little, however, carrying the metal, this occurring in the loose, shifting gravel, with numerous rich, clayey streaks.

"The ground through which the old Providence tunnel was driven 800 feet on the northwestern ledge, and immediately joining the hill, shows the slates in their undisturbed horizontal position.

"The original discovery of gold was made at a spring on the Providence ground, and located as a placer claim. Seventy-eight thousand dollars was taken from it, and much more from shallow fissures higher up the hill. Afterward abandoned, it was left for those of greater faith and courage to sink deeper, where richer strikes and continuous pay rewarded their efforts. It would doubtless be difficult to make the average mining man believe that mines of any extent or permanency existed in this volcanic, rock-bound country, yet very slight developments give evidence of increased richness as depth is attained, and while it is clear that infiltration is well defined, yet general permeation of the fissure vein at lower levels are suggested as highly probable by the very satisfactory results at a depth of 300 feet.

"The upper surface fissures are narrow, but, so far, have invariably widened with depth—the maximum width being about 20 feet.

"One thing must not be lost sight of: The working of these mines has been prosecuted with meager capital, or entirely upon the gold as extracted; no systematic 'opening up' has been thought of, so extraction has followed consistent only with the safety of the mine and miners. So our visiting mining man, in sampling, makes a questioning side-note of the rich streak, then averages the other gangue matter, taking gravel and loose country rock (and that in the few openings in the mine), and is hardly satisfied with the result. He cannot accept the record of what has been accomplished by owners as any part of a basis for calculation; hence the properties fail to realize such figures as the owners and close observers know them to be intrinsically worth, and which sums will probably be extracted in the economical way now employed, although extended time will be required. The extraction of gold is by both mills and arrastras—three 5-stamp batteries, and a number of arrastras, all having the advantage of a good water-power 3 miles from the mines. There is also a 5-stamp battery moved by steam-power, and an abundance of timber everywhere.

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"Considerable care is used in saving the valuable part of the vein material, it being graded and the finer quality at once stored. The medium-sized rock is screened; afterward the whole of the rock, apparently clean, is washed in tanks and relieved of the precious clinging particles, each step paying well for the handling. The fine gravel 'concentrations' (?) reach the battery or arrastra in due time. This washing has been found so satisfactory that it will be more generally used than heretofore.

"There are many matters of interest concerning the mines and district which I will leave to others who will come after me, and will yet have even richer statistical tales to tell of these slowly developing claims."

LOS ANGELES COUNTY.

Los Angeles County lies in the southern part of the State, and has until recently been looked upon as a purely agricultural, fruit and grape growing county. The last few years gold mines have been prospected for in the mountains near Anaheim, the German grape-growing colony of that county. Both gold and silver have been found in paying quantities, and quite recently placer diggings have been discovered in Castica Cañon and its immediate neighborhood. Competent experts have recently made an examination of the placer diggings, and report that placer gold is there in sufficient quantities to keep a large mining camp employed for decades. The Castica Company have just completed a water ditch, which will carry 1,800 inches of water, and have a fall of from 200 to 300 feet. There is no lack of water at the source of the ditch to supply this amount, and that being the case, we may look with certainty for gratifying results from the Castica district. Nothing but water has been wanting to bring this camp into notice, and make it one of the best auriferous producing districts in the State. Gold is distributed through the entire district. So rich has it been in places, that inexperienced miners have made good wages whenever they could get a pool of water in which to wash the dirt by pan process. The gold ranges about 22 carats fine, and brings at the United States mint $19 per ounce. The Winston mine and its extensions situated in San Gabriel Cañon is being thoroughly prospected, and gives promise to become productive.

MARIPOSA COUNTY

lies between the counties of Tuolumne, Merced, and Fresno.

The mines of Mariposa County are principally distributed around several mining centers. One of the most important of these is Hornitos, including Indian Gulch and Cathey's Valley. We commence with the group of mines owned by Mr. M. Huling. These are the Yosemite mine and mill, commonly called No. 9, the Pool, and Mount Gaines.

The Yosemite, or No. 9 mine, situated about 3 miles easterly from Hornitos, is now in successful operation. The vein No. 2 varies from 3 to 8 feet in thickness. There are two shafts, the older one about 100 feet deep, and the new one, when completed, about 200 feet, with corresponding levels. About 25 tons of ore per day is taken out, yielding from $9 to $13 per ton, at an expense of about $5 per ton. This mine under the new management has been successfully worked for about two years. During this time it has steadily improved and is regarded as a reliable and permanent mine. It has 30 stamps run by steam, each crushing, when in operation, a ton of ore per day. About 25 men are employed at the mill and mine.

The Pool mine lies about one mile west of No. 9, between that mine and Hornitos. It is an old mine which has been worked at different times and has yielded considerable good and even excellent ore. The vein averages about 3 feet thick, and a shaft about 150 feet deep with several levels run. This mine and the 5-stamp mill connected with it are not at present in operation owing to scarcity of water, but is expected to resume operations as soon as water can be obtained.

The Mount Gaines mine lies about 4 miles northeast of Hornitos and about the same distance from the Yosemite or No. 9. This is an old mine upon which considerable work has been done in former years and is still in successful operation. Since his purchase about a year ago Mr. Huling has sunk a new shaft about 150 feet deep upon the vein, which is about three feet thick, producing excellent ore from the level reached by the new shaft, which yields from $20 to $30 per ton. There being at present no mill on this mine, all the ore has been hauled to the Yosemite mill and there crushed. But the latest ores are so full of sulphurets rich in gold that the proprietor is now introducing the chlorination process for their treatment. About 10 men are employed at this mine.

The next important mine in this vicinity is the Eureka, formerly known as the Quartz Mountain mine, situated about 3 miles southeast of Hornitos on the Indian Gulch road. It is owned by Messrs. George E. Webber, Moses L. Rodgers, and others, late members of the old Washington Mining Company. This is an old mine upon which several shafts have been sunk and a great amount of good ore taken out. The company are now sinking a new main shaft to place the mine on a permanent basis. The vein varies from 5 to 10 feet thick, and the rock at present extracted is estimated at $30 per ton. The rock is hauled to the old Washington 20-stamp mill, a distance of 3 miles. The mill belonging to the same proprietors was built for the abandoned Washington mine and has now upon its dump about 300 tons of ore taken from the Eureka, awaiting a sufficient supply of water necessary for milling purposes. The Eureka mine is generally recognized as a highly valuable and permanent mine, possessing an almost inexhaustible vein of gold-bearing quartz. About 10 men are at present employed.

About 4 miles northwest of Hornitos lies the Enterprise mine, formerly called the Jersey. It is owned by the Enterprise Company, of which Messrs. Ralph W. Bancroft, Andrew Olcese, and others of Hornitos are the principal stockholders. This is an old mine which has been worked more or less in former years but not extensively. The present company have a shaft about 200 feet deep, showing a good vein from 2 to 4 feet thick of good milling ore estimated at $25 a ton. This mine has no mill, but has from 75 to 100 tons of ore upon the dump, waiting for a mill to be erected or other arrangements made; at present no work is being done

The Campodonico mine, belonging to the estate of the late A. Campodonico, is a good mine, situated about one mile east of Hornitos. Considerable work has been done by sinking shafts, running levels, and erecting a 10-stamp mill. It was in successful operation for several years prior to the proprietor's death. The unsettled condition of his estate has prevented its regular working since.

In the immediate neighborhood of Hornitos is the Santo Domingo mine, formerly belonging to the Zamorras, now the property of G. Galindo & Co. It is considered a good mine and has been worked at different times till recently, and work may be resumed at any moment.

The Silver Lead mine is situated about four miles northerly from Hornitos, and is a very valuable property. Its manager and principal owner is A. B. Rowley. It has a shaft 250 feet deep and a vein 2 or 3 feet thick of very rich ore, yielding from $40 up to $150 per ton. The expenses of extraction, however, are very great. The quartz itself is very hard and refractory. The walls are very hard material and they are troubled with a great deal of water. They are running a 10-stamp mill and employ two shifts of hands.

About four miles east of Hornitos lies the Amelia vein, now in litigation between George Chittenden and James F. Peck. It is undeveloped, and all operations are now suspended.

The Grimshaw is an extension or branch of the same vein, belonging to Edward Smith. The work done upon this vein is quite limited.

The Duncan mine, about one mile southeast of Hornitos, is another of these undeveloped mines which have prospected favorably but have never been really worked. It belongs to Jermore B. Brown by United States patent.

The foregoing are substantially all the mines of any present importance near Hornitos.

In and near *Indian Gulch*, about five miles southeasterly from Hornitos, lies the old French mine, now owned by Frank Mallett, and is considered a valuable property, but is suspended, owing to litigation between the owner and parties to whom he bonded the mine.

At the head of Cathey's Valley, about 10 miles east of Hornitos, lies the Christmas Gift mine, formerly belonging to W. B. Thomas and C. S. Thompson, and now owned by Messrs. Piatt, McDonald, and Walton. The vein is decomposed talc and quartz, and varies from 12 to 24 inches wide. The shaft is 100 feet deep, with two levels from foot of shaft, each 85 feet long, running each way east and west from bottom of shaft. They use a 5-stamp steam-power mill and crush 4 tons of vein matter daily, averaging $25 a ton, at an expense of about $10 per ton. Fifteen men, including the proprietors, are employed at this mine. The mine has been worked about two years, and its prospects are considered excellent.

About one-half mile southerly from the last-named mine is the Kendall, owned and worked by Thomas Kendall for several years past. This vein is about 6 to 8 inches thick, confined between very hard walls, and yields ore containing from $30 to $50 per ton. The gold is extracted by an arrastra on the mountain between Hornitos and Bear Valley.

There are two mines which demand particular notice.

The Juniper mine lies on the easterly side of the main road about three miles from Bear Valley. This is a vein of solid quartz, averaging about 3 feet wide, between hard walls. The main shaft is 75 feet deep, with a level from the bottom running westerly 90 feet and easterly 40 feet. The rock averages $25 per ton, at an expense for working of about $10 per ton. It has been successfully worked for one year, and during that time the rock has continually improved. It is considered a valuable and permanent mine. They have a 5-stamp steam mill capable of crushing a ton per stamp per day when a sufficiency of water for milling purposes can be obtained. They work two shifts, 4 men to each shift; total number of men employed, 13.

On the same mountain ridge, three miles farther west, on what is called Sebastopol Creek, is found a still newer mining enterprise. The Morning Star Mining Company, a Modesta company, have bought a mine formerly owned by Philip Gosser, and have commenced operations on quite a large scale. The vein is reported to be 20 feet wide, with gold generally diffused through the rock, and averages from $9 to $14 per ton. They have a new 10-stamp steam mill and employ from 10 to 14 men. The cost of extracting the ore and milling averages about the same as other similar works.

The Mariposa Grant next claims our attention. All the mines on this estate are now suspended, with no immediate prospect of resuming operations. The unfortunate litigation in which they have been so long involved resulted during the past year in a judicial sale, which was completed by a sheriff's deed a few months ago, and the new purchaser has not yet indicated his purposes with regard to the future. The principal mines on this grant are as follows: About half-way between Bear Valley and the Merced River, a distance of 5 miles in all, are the Pine Tree and Josephine mines. The Pine Tree has a vein varying from 6 to 30 feet wide, and the entire depth of the shafts is 900 feet. The Josephine lies on the mountain, a short distance above the Pine Tree. It is probably a continuation of the same lode or vein. The shafts are 520 feet deep and the drifts on the lode over 500 feet. On the river is situated the mill commonly called the Benton mill, with 50 stamps, connected with these mines. The Merced River at this point is dammed and furnishes sufficient water-power for the extensive mill and machinery there erected. This is evidently one of the finest water-powers in the State. At this point a tunnel begins, penetrating the mountain with a view of intercepting the veins already described, which would require 8,750 feet in all. Of this distance only 3,600 feet have been completed. Just out of Bear Valley, near the Hornitos road, is the Oso mine, formerly very rich, but which has not been worked for several years. About one mile and a half in a southeasterly direction from Bear Valley is the Mexican mine, with a shaft 160 feet deep. Seven miles easterly, on the road leading to Mariposa, is Princeton. Here are the Princeton and Green Gulch mines. The Princeton mine has been extensively worked in former years and has produced immense quantities of ore, but has been greatly neglected for years, owing to the misfortunes of the company. Though doubtless a valuable mine, it would cost a very large sum of money to put it in working order again. The Green Gulch mine has been wholly abandoned. The Mount Ophir mine, on the Bear Valley road a mile west of Princeton, once one of the principal mines of the grant, has not been worked for many years. The Mariposa mine, just out of the town of Mariposa, was the seat of extensive operations in the time of the old Mariposa Company over fifteen years ago, but all the late owners of the grant have neglected it. It is to be hoped that the new owners of the grant will make arrangements speedily either to sell or to work the numerous developed and undeveloped mines on their estate. If they should decide to commence active operations themselves, in our judgment, judging from its past history, the long-neglected Mariposa mine would yield larger results at less expense than any other mine on the list.

Leaving the Mariposa Grant and crossing the dividing ridge between the waters of Mariposa Creek and those that flow into the Merced River, we find a cluster of important mines around Sherlock's, about 6 miles northwest of the town of Mariposa.

Foremost among these stands the Diltz mine, owned by Mr. John S. Diltz. It lies upon the easterly side of Sherlock Creek, 6 miles north of the village of Mariposa, and has been worked upon a limited scale for the past twenty-five years. It consists of deep bank diggings, which contain numerous strata of quartz rock, ocher, and vein matter from which a great amount of gold has been taken with the aid of water and sluices whenever a favorable rainy season occurred. The hill or placer diggings are quite extensive and deep. The regular quartz vein, which is from 3 to 5 feet thick, has been thoroughly prospected, and shows gold milling ore from $8 to $14 per ton. The mine has been bonded to an eastern syndicate in the neighborhood of $100,000.

The Breen mine adjoins the Diltz, and is of the same character. It is worked principally for its rich placer and specimens of float rock. Its owner depends upon rainy seasons for water to sluice out what he has dug and piled up during the dry season. The mine has a large body of excellent milling ore, which assays an average of $14 per ton. This mine is also bonded, together with the Diltz mine.

The Whitlock mine, now the property of the members of the original firm of Sullivan, Cashman & Dimond, once merchants of Mariposa, lies on the dividing ridge between Sherlock's and Whitlock's Creeks, and about 2 miles above the junction of the two creeks and about 1½ miles from the Diltz mine. This mine has produced large quantities of rich ore, and there is no doubt but that under proper management in the hands of those able to supply the capital necessary to place it in complete working order it would be one of the richest and best-paying mines in the county. The vein averages from 4 to 8 feet thick, and the rock taken from it has averaged about $30 per ton.

The Schrœder mine is about 1¼ miles northerly from the Diltz mine, on Saxton's Creek, and is the property of John Schrœder, who has by his own almost unaided labor developed a mine both in placer and quartz rich in gold, and which has a future promise equal to any in the county. About 5 miles of water ditch have been built, also 900 feet of 8-inch pipe laid across Deep Creek, which conveys water to the claim, and lasts about six months of the year. This is a claim of 20 acres of mining ground, secured by United States patent. The diggings are deep, and some very rare specimens of quartz gold have been picked up by Mr. Schrœder from this claim. The rich vein exposed within the past year by the work is from 2 to 5 feet wide, and is likely to be of great value. Mr. Schrœder, for his industry and good management, is quite certain soon to be well rewarded; he evidently has what the miners call "a good thing."

There is a group of old quartz mines on Whitlock's Creek, about a mile westerly from the Diltz mine (they were worked as early as 1854, and some of them as late as 1863 and 1864), known as the Margarita, Golden Fleece, Bessie Collins, Fortuna, and Goodman mines. Some yielded from $17 to $50 per ton, but were worked at great disadvantages by the discoverers, who at that early period lacked experience as well as means to develop them. They are considered valuable, and in May last a company was formed and the mines relocated, with a view to raising a working capital and reopening the works. Mr. John Higman, a merchant of Mariposa, was one of the original owners, who spent considerable time and money on these mines at the early period mentioned. He is still the principal owner, and attaches great value to them. The deepest shaft sunk on any of these mines is 200 feet. The style of the new company is the Whitlock Consolidated Mining Company.

McCann mine lies contiguous to the Diltz mine, on the opposite side of the creek, and is a probable extension of the latter, the character of rock and formation being similar to that of the Diltz. It has a shaft about 75 feet deep, and has been worked by two or three men, laboring under great disadvantages, for a few months nearly every season. There is a rich body of ore at the bottom of the shaft, but, for the want of means to construct a pump to remove the water, but little progress is made in developing the mine. It is owned by Patrick McCann, an old pioneer, who tenaciously clings to this property.

About 5 miles northerly from these mines at Sherlock's, Whitlock's, and Saxton's Creeks, is the old Feliciana mine, now owned by J. B. Campbell, of Fresno, who holds it under a United States patent. It was discovered by Mexicans, who, with others, afterwards gouged and worked out a rich chimney of ore 200 feet deep. At first, hand mortars were principally used, and an almost fabulous amount of gold was reported to have been taken out by the Mexicans at the time of the discovery. The mine afterwards fell into the hands of an Italian merchant, who built a mill, ran a tunnel 350 feet into the mine intersecting the tunnel 200 feet from the surface, and was just in a fair way to do well when the mill burned; his store, with a heavy stock, was also destroyed, which caused him to suspend his mining operations. The mine was afterwards bonded, and another mill built, but from some cause the new company proceeded no further. The 10-stamp mill and engine are still on the mine, neither of which has been worked since. This will be the leading mine of this section whenever capital and proper management take hold of it.

Buena Vista or O'Gorman.—This mine lies some 8 or 10 miles northerly from the town of Mariposa, and belongs to Messrs. O'Gorman & Brother. It was worked to a considerable extent many years ago, and was quite remunerative. The O'Gorman Brothers, who lately came into possession, are doing considerable work in tunneling upon the vein and piling up ore. It is a well-defined vein, varying in thickness from 2 to 10 feet, with considerable sulphurets and gold generally diffused through the vein. The erection of a mill is contemplated the coming season.

Malone mines.—These mines consist of placer and quartz veins, which are situated about 5 miles northerly of Mariposa near Clark's old sawmill, on the waters of Bear Creek. The owner, Mr. James H. Malone, has been engaged in hydraulic mining on this claim for the last fifteen years. He has a ditch about 10 miles long which controls the water of Snow Creek, the only living creek of water all the year round in that section. The creek, together with a fair winter's rain, affords water in the ditch sufficient for hydraulic purposes six months in the year. Since the hydraulic process commenced, several valuable quartz veins have been exposed, on the strength of which Mr. Malone has erected a 10-stamp mill, which is run by water. The quartz-crushing interest is now leased to new parties, who are ready to proceed with the work as soon as water sufficient can be had. Mr. Malone has 60 acres of patented land, which is nearly all mining ground, suitable for hydraulic purposes, besides numerous quartz veins, many of which are valuable. A large amount of piping and machinery for hydraulic purposes is to be seen upon the premises. It is estimated by Mr. Malone that he has washed out of his claim since the commencemont at least $150,000.

Bailey Field.—This is an old vein about 4 miles north of Mariposa, on the road leading to Colorado from Mariposa; some hundreds of tons of ore were taken from its outcroppings some twenty-five years ago, and hauled 2½ miles to Stockton Creek, and ground in an arrastra, which paid from $30 to $40 per ton, since which time but little work has been done, except to work annual assessments by claimants. The vein shows from 2 to 3 feet thick, and gold is generally diffused through the rock. It is at present owned by W. H. Woodard and Arthur L. Reynolds.

About 6 miles southeast of the town of Mariposa is the property of the Modesto Gold and Silver Mining Company, formerly known as the Hambleton mine. Silver is the predominating mineral, although there is a large percentage of gold. The vein is narrow, being from 11 to 16 inches thick, estimated from $30 to $100 per ton, with a shaft 250 feet deep. Since the existence of the company, the management of the mine has been subjected to various changes. It is at present leased to Dr. Rice, of Modesto, who is constructing new machinery, which is nearly completed, at considerable cost.

Further to the southeast, about 8 miles from Mariposa, is a new mine of gold-bearing quartz, called the Ho-Bettie mine, belonging to Messrs. Keefe, Allen and Walker. They have sunk about 50 feet on a 2-foot vein, and the ore upon the dump is estimated at $30 per ton. A 5-stamp mill with steam-power is being erected at the mine, and the company, which is composed of old, experienced miners, are rich in expectation.

Hite mine.—Sixteen miles due northeast from the town of Mariposa, though more than 20 miles by the wagon road, on the northerly bank of the South Fork of the Merced River, lies Hite's Cove, another mining center. The Hite mine, the principal mine here, now owned by the Hite Gold Quartz Company, has been one of the richest and most productive mines in the county, and there is no reason to believe that it has become any less valuable. The company had gone to work on a large scale (about double that of Mr. Hite, its former owner), and had constructed one of the largest compressors in the State, sunk a shaft 300 feet below the 900-foot level, added 20 more stamps to the mill (making 40 altogether), built roads, repaired dam and flume, besides various other improvements which caused a large outlay of capital before an adequate return could be realized from the mine. Unfortunately about this time the principal owners were largely involved in other mining companies, and their financial arrangements became so complicated and entangled that they were compelled to suspend operations last September. But we have every reason to expect that this mine, either under the present or some other ownership, will soon be reopened and work resumed on a successful foundation.

North Hite.—The North Hite is not a mine, but a name of a vein, or a series of veins, as yet undeveloped.

The South Hite is a mine that has been prospected rather than worked for many years. Shafts have been sunk to the depth of over 500 feet, and several levels have been run at 200, 300, and 500 feet; but although all this work has been done, ore has not yet been found in sufficient quantity and of sufficient value to authorize working on a large scale, and operations are practically suspended.

El Carmin.—This mine is situated about 5 miles east of Hite's Cove, on top of a high mountain, and belongs to Robert Williams, of Mariposa. The mine originally furnished some very rich ore, since which time considerable money has been expended in running a tunnel striking the vein at some 400 feet deep, but failed to intercept the rich body of ore anticipated. It is thought to be a good mine, and that it contains a fine body of ore which will require more capital and labor to reach. The former is but an extension of the same mine, now belonging to the same parties.

North of the Merced River is another rich mining district, having its chief center and separate records at, and taking its name from, Coulterville.. In the immediate vicinity of that place are several valuable mines, and a far larger number of those that are indefinitely suspended or abandoned. Among the former are the mines of the Cook Brothers, the Malvena, Mary Harrison, and the Potosi. These are valuable mines that have been successfully worked down to a late date. The death of one of the brothers has suspended operations until the final settlement of his estate.

Flanigan mine, near Coulterville, belonging to Martin Flanigan and others, is a pocket mine, and has been worked at intervals for many years. Some very rich pockets have been found, and it is still worked by its owner.

Virginia or Coe mine is in the same neighborhood; it is an old mine, but still valuable. It is not in operation now, because the estate of its last owner, the late J. M. Aiken, is still unsettled.

The Louisiana mine is an old mine, lying about 12 miles above Coulterville, from which considerable ore has been extracted and crushed in a 10-stamp steam mill, which was destroyed by fire several years ago. It is a well-defined vein from 3 to 6 feet thick, and yields from $20 to $40 per ton. It has a shaft about 200 feet deep which meets with considerable water, which was the principal cause of its early suspension. Considerable work has been done on the surface and outcroppings, which paid well. The mine now belongs to J. B. Campbell of Fresno, and Dr. J. T. Turner of Mariposa, who hold under a United States patent. Old miners who are familiar with this mine speak very favorably of it, and say it would pay largely with proper machinery to keep the water out.

The Shimer mine, which is a probable extension of the Louisiana vein to the east, is owned by James Shimer, of Coulterville, who has done considerable work on it. The ore extracted was crushed in a 5-stamp steam mill. This mine also has to contend against water and sulphurets, but is the same character of mine as the Louisiana in other respects. The Louisiana and Shimer mines, lying contiguous, would together make a valuable mining property for a company able to work them.

Ball Creek region.—About 15 miles northeast of Coulterville, on Ball Creek, lies another and still richer cluster of mines. The Compromise or Marble Spring mine, belonging to the Compromise Gold Mining Company, is one of the best appointed and most promising mines in the county. The main shaft has been sunk 250 feet, and there are levels at 100, 150, and 200 feet. The rock yielded from $20 to $30 per ton, and it costs about $10 a ton to extract the gold. It has a 10-stamp mill run by steam, crushing about one ton per day per stamp. About 30 men are employed.

In the same vicinity is the Banderita mine, owned by P. P. Mast. This is an old mine, formerly worked by the Goodwin Brothers, who extracted a large amount of gold from the mine, near the surface. A 1,600 foot tunnel has just been completed, which has penetrated a good body of ore, which is being taken out and crushed in an old 10-stamp water-power mill. The ore is estimated at $30 per ton. The pay chute is from 3 to 6 feet thick, and lies between walls some 10 or 15 feet apart. The owner will make extensive improvements upon this mine the coming season; at present about 15 men are employed.

Martin and Walling.—This mine, in the same vicinity, also belongs to Mr. Mast, but is not at present worked. It has a 5-stamp steam-power mill, and the mine is in good condition for prosecuting the work. Considerable gold was taken from it the present season. The vein is broken, lies in bunches, and varies in thickness and quality.

Bunnell vein.—This vein is of but little note, although worked on a small scale; but as yet has developed no remarkable ore-body of any richness.

Ferguson mine.—On the north bank of the main Merced River, opposite Hite's Cove, is the Ferguson mine, once considered very rich and valuable. But it is broken, and its rich ore-bodies irregularly located; hence it has become an expensive mine to work, although it is being worked on a limited scale at present by a few men. It has a 10-stamp water-power mill, capable of crushing a ton to the stamp per day.

The Red Bank hydraulic mine is situated on the right bank of Merced River, near Split Rock Ferry, about 3 miles below the Benton mill and dam. It is owned by a New York company, and superintended by Col. W. W. Swadley, of Mariposa. The mine and claim consist of 40 acres, and its gravel-bed is from 20 to 80 feet deep. About 6 miles of ditches are connected with the mine and works, but are dependent upon a rainy season for water. Attached to the mine, for hydraulic purposes, are 1,200 feet of pipe, tapering from 11 to 42 inches, and two giants. The company have expended $36,000 in improvements and opening up the mine. Owing to the last two dry seasons, the company have been unable to clean up from the bottom of their ground-sluice the result of their labors. The claim is thought to be a good property, but the lack of water is against its success. Permanent water to this mine could be obtained by means of a flume connecting the mine with the dam at the Benton mill, about 3 miles distant.

The other mines of the district are mostly abandoned. Many locations have never been worked.

MONO COUNTY.

For nearly a quarter of a century mining has been the principal, if not the only, industry of importance in Mono County. At times it has reached a very low ebb, and at others it has been attended with the wild excitement which usually accompanies valuable discoveries of the precious metals. Gold was first found in the county by adventurous prospectors who drifted over the Sierras from "Old Tuolumne" in the latter part of the fifties, in the placer mines of Monoville. At that time but little interest was taken in quartz mining, and but little knowledge had been acquired of the methods of conducting it successfully. The amount of production of the Monoville placers has never been fully stated, but it undoubtedly aggregated several hundred thousand dollars.

The discovery of the rich gold-quartz mines of Aurora in the adjoining county of Esmeralda, State of Nevada, early in the sixties, had more to do with the depopulation of Monoville and the practical cessation of work there than the exhaustion of the placers. Work has been carried on in a spasmodic manner at and in the neighborhood of the scenes of former activity, and at present preparations for work on an extensive scale are being made by the Mono Lake Hydraulic Mining Company, a short distance from old Monoville.

The importance of Mono County as a mining section, however, has been due not to its placer mines, but to its quartz mines, the most productive of which thus far have been found in *Bodie district.* This district was discovered by W. S. Body and a small party of prospectors in the autumn of 1859, and the fact that Body subsequently perished in a snow-storm while making his way to the mines gave the district its name, with some change in orthography. In 1863 and 1864 two quartz mills were erected and operated for a short time, but without any great degree of success. The district was then practically abandoned, except by a half dozen miners, who extracted and sampled from the rich ore at the surface, and worked them at Arrastras some four miles distant.

In 1877 attention was again called to the district by the purchase and incorporation of the Standard mine. The owners had sunk an incline on the vein to a depth of about 200 feet, showing a continuous body of free milling ore, and the purchasers paid for the property $67,500. Before the close of the year they had extracted from the mine and milled sufficient ore to build a 20-stamp mill, at a cost of about $80,000, and to declare three-months dividends of $50,000 each, as well as reimburse themselves for the original purchase price. During the five years since then the Standard mine has paid a dividend every month, ranging from $25,000 to $150,000 each, and aggregating, including the dividends for December, 1882, $4,025,000.

The success of the Standard mine gave new impetus to the district, and development was commenced on a large number of other claims, with more or less success. Among these bullion has been produced by the Syndicate, Bodie Tunnel, Bechtel Consolidated, Bulwer Consolidated, Blackhawk, Bodie Consolidated, Dudley, Summit, Red Cloud Consolidated, Oro, Noonday, North Noonday, and Boston Consolidated mines. The only companies which have produced in sufficient quantities to declare dividends have been the Standard, Bodie, and Bulwer.

The Bodie mines are found in a belt of trachyte porphyry running north and south, about 3 miles long and a mile wide. The porphyry belt is bounded on the east and west by a black trachyte, as well as on the north and south. The north end of the belt is marked by a mountain called Bodie Bluff, on which are situated the Syndicate and Tioga mines. The next elevation, in a southerly direction, is called High Peak, on which are located the Standard and Bulwer mines.

The Bodie mine adjoins the Standard on the south, and runs down High Peak on its southerly slope.

The next southerly elevation is Silver Hill, where the Dudley, Oro, Goodshaw, Addenda, Red Cloud, Concordia, Maybell, Noonday, and North Noonday mines are situated. The most southerly of these porphyry elevations is Queen Bee Hill, on which are located the Queen Bee, University, Maryland, Boston Consolidated, and Last Chance mines.

The Standard mine is 1,200 feet in width by 1,500 in length, covering the greater portion of the summit of High Peak Hill, and extending some distance on its southern slope. The mine was originally worked through an incline shaft, which was sunk on the vein about 700 feet. As the ledge to that depth was found to pitch steadily to the west, the trend of all Bodie veins being north and south at an angle of about 50°, a vertical three-compartment shaft was started about 1,000 feet west of the incline. This shaft has now attained a depth of 1,200 feet, and both are steadily employed in the working of the mine. Levels have been run from the vertical shaft at 385, 500, 700, 1,000, and 1,200 feet.

In cross-cutting east from the vertical shaft at the 385-foot level for the vein which had been the source of ore supply, a new and unknown vein was cut, from which hundreds of thousands of tons of ore and millions of dollars in bullion have since been taken.

These two veins have been found to extend from the north to the south end of the Standard mine, on all the levels down to the 500-foot level. At the north end of the mine they were very wide, and of low-grade ore. At the south end they were narrow, but exceedingly rich. The extension of these rich veins at the south into the Bodie mine gave that property its celebrity as a rich ore producer.

In working their ores the company have exercised a judicious discretion in grading the low grade at the north end with the richer quality at the south, thus maintaining a uniform good grade. During 1877 and 1878 the company had but one mill, of 20 stamps. In 1879, in connection with the Bulwer Company, a 30-stamp mill was erected, which has been employed by the Standard Company nearly all the time since, thus affording them a crushing capacity of 50 stamps. An elevated cable tramway conducts the ore from either shaft to the old mill, while ore for the Standard-Bulwer mill is taken from the mine through the Bulwer tunnel, through which also the water is pumped, saving four hundred feet of hoisting. The mine has produced about a quarter of a million tons of ore. A vast amount of ore still remains above the 500-foot level, though the rich reserves, with which the grading has heretofore been done, have been nearly exhausted, in consequence of which the monthly dividends were cut down in September, 1882, from $75,000 to $25,000.

The ledge has been found on the various levels below the 500-foot, but the ore up to the present writing (December, 1882) is not of sufficiently high grade to be of value.

A cross-cut now being run near the south boundary line, and adjoining the Bodie mine, at the 1,000-foot level, gives good promise of a valuable development.

The output of the Standard mine during 1882 was as follows:

Months.	Gold.	Silver.	Total.
January	$145, 954 14	$14, 197 31	$160, 151 45
February	125, 164 90	10, 268 68	135, 432 58
March	110, 085 38	13, 112 18	123, 197 56
April	130, 739 69	14, 880 60	145, 620 29
May (no production; mine and mills closed down for repairs)			
June	101, 605 38	12, 254 83	113, 860 21
July	72, 046 94	9, 747 83	81, 794 77
August	68, 612 62	9, 010 25	77, 622 87
September	88, 100 78	11, 186 45	99, 287 23
October	91, 044 28	8, 405 12	99, 449 40
November	115, 000 00	15, 000 00	130, 000 00
December (estimated)	90, 000 00	10, 000 00	100, 000 00
Totals	1, 138, 354 11	128, 063 25	1, 266, 417 36

The total production of the Standard mine has been as follows:

1877	$784, 522 80
1878	1, 025, 383 35
1879	1, 448, 845 47
1880	1, 858, 763 46
1881	2, 131, 458 87
1882	1, 266, 417 36
Total to December 31, 1882	8, 515, 391 31

The proportion of gold and silver in the bullion has been in the aggregate 92½ per cent. of gold and 7½ per cent. of silver. The proportion of silver is somewhat greater at present than heretofore, but does not exceed 10 per cent.

Taking 250,000 tons as the amount of ore extracted, it would show the yield to have been $34 per ton. The gross yield of the mine having been $8,515,391.31, and the dividends having aggregated $4,025,000, the expense of mining and milling 250,000 tons of ore would be $4,490,391.31, or $17.96 per ton. This includes expenses of every character, such as taxes, insurance, attorneys' fees, &c., in addition to technical milling and mining expenses.

The ore now being worked is lower grade than heretofore, and greater quantity is being run through the mills, and at a consequent increase of cost per ton; nearly 4 tons of ore daily is worked to the stamp. An average of about 175 men is employed at the mine and mills. The underground workings would aggregate several miles of drifts, crosscuts, shafts, winzes, upraises, stopes, &c.

The Bodie Consolidated mine adjoins the Standard on the south. Its area originally embraced about 1,000 feet in width by 1,500 feet in length; but the southern half, or 750 feet, was segregated from the Bodie, and constituted the Mono mine, in 1879. The two have since been worked in conjunction with each other, but the pay ore has been found almost exclusively in the Bodie.

The veins of the Bodie mine have been generally narrow, but very rich. The first month of milling, July, 1878, yielded the almost unprecedented sum of $600,000 from a 20-stamp mill. The company now has a 10-stamp mill, situated about 2 miles from the mine, which has been kept steadily employed for three years. The mine is worked through a large three-compartment shaft, called the "Lent shaft," situated near the south line of the Bodie proper. This shaft has attained a depth of 1,000 feet, where a new level has been started. As the collar of the Lent shaft, taking the contour of the hill, is 255 feet lower than the Standard shaft, the 1,000-foot level would be on a plane of 1,255 feet in the lower mine. The Bodie veins to a depth of between 300 and 400 feet from the surface were found to incline slightly west, but at that point a vein called the "Fortuna" was intersected pitching sharply to the east (at an angle of about 30°); this vein has been developed on the various levels to a vertical depth of 800 feet, and though narrow, varying from a few inches to 4 feet in width, has been the source of ore supply since 1879, and has yielded several hundred thousand dollars.

The shipments of bullion during 1882 have been as follows:

Months.	Gold.	Silver.	Total.
January	$25, 673 80	$11, 896 23	$37, 570 03
February	21, 167 31	12, 051 04	33, 218 35
March	19, 389 02	12, 060 48	31, 449 50
April	20, 242 95	14, 789 79	35, 032 74
May	36, 277 06	27, 947 86	64, 224 92
June	20, 129 33	14, 104 38	34, 233 71
July	24, 878 32	16, 879 59	41, 757 91
August	25, 297 28	19, 667 24	44, 964 52
September	17, 218 01	17, 378 92	34, 596 93
October	22, 076 41	30, 460 90	52, 537 31
November	21, 008 76	23, 071 02	44, 079 78
December (estimated)	22, 000 00	25, 000 00	47, 000 00
Total	275, 358 25	225, 307 45	500, 665 70

The production of the Bodie mine complete to date has been as follows:

1878	$1,042,236 80
1879	764,067 12
1880	429,817 80
1881	366,105 14
1882	500,665 70
Total	3,102,892 56

During 1882 the Bodie has declared four dividends, aggregating $95,000, and has altogether disbursed $1,295,000 among its stockholders. The mill reduces an average of 110 tons of ore per week, at which rate the net yield during the past year would be about $87 per ton. An average of 150 men is employed in all capacities at the mine and mill. The bullion produced in 1882 shows a proportion of 45.2 per cent. silver and 54.8 gold.

The largest bullion-producing mines in Bodie district, outside the Standard and Bodie, have been the Noonday and North Noonday. These mines, which are nearly a mile south of the Bodie, have been worked jointly, through a common three-compartment shaft and a double mill of 40 stamps, 20 stamps each. The mine has been developed and worked on successive levels, at a depth of 212, 312, 412, and 512 feet, below which lower level an incline was sunk to a depth of nearly 400 feet, from which two levels were run. The ore from this mine has been generally of low grade, from $15 to $25 per ton, though there have been exceptional finds of rich ore in various parts of the mine. Great difficulty was experienced and expense incurred by these companies in contending with water, and in connection with other mines in the neighborhood a large pump was placed on the Red Cloud, an adjoining mine, for the purpose of draining the country. These very extensive works were the occasion of the creation of a debt which, with that of the Red Cloud Company, aggregated about half a million dollars, for which amount the properties were attached early in December, 1882.

The litigation thus inaugurated is likely to keep these mines closed down for several months, at least, and possibly longer. The production of the Noonday mines has been something over a million dollars. The figures given below for 1881 and 1882 are not official, but are believed to be nearly correct:

1879	$36,322 29
1880	511,757 21
1881	244.000 00
1882	215,000 00
Total	1,007,289 50

About 175 men have been employed regularly in the Noonday, North Noonday, and Red Cloud mines.

The Syndicate mine is situated at the extreme north end of the Bodie mineral belt. It is worked by tunnels exclusively, its 20-stamp steam mill standing at the entrance of the main tunnel, which explores Bodie Bluff at a vertical depth of about 800 feet. Ore has been reduced from a number of veins, but of too low grade to permit the property to become dividend-paying. A vast amount of exploration has been done, aggregating something more than 2 miles of drifts, cross-cuts, and winzes. The mill was the first erected in the district, and has been employed for the most part on custom work. It is now engaged in milling its own ore, and it will doubtless continue to be so engaged during the coming year.

The production of the Syndicate during 1882, with December estimated, was $83,677.20, of which $76,426.14 was gold and $7,251.06 was silver, the proportion being 91.4 per cent. gold and 8.6 silver. The total production of the Syndicate to December 31 has been as follows:

1879	$12, 316 18
1880	24, 769 75
1881	134, 706 30
1882	83, 677 20
Total	255, 546 43

The Bodie Tunnel and Mining Company work their property through a tunnel which enters Bodie Bluff on its western side. This tunnel is over half a mile in length, and its course intersects twenty-one veins of various widths. The greater part of its ore has been taken from ledges Nos. 20 and 21. Its mill of 15 stamps capacity commenced crushing in February, 1882, and up to December 12 of the same year it had produced $109,987.03 in gold and $7,766.06 in silver; total $117,753.09. The proportion is 93.4 per cent. gold and 6.6 per cent. silver. In 1881 the Bodie tunnel received $10,628.81 from ore worked in a custom mill, and it is probable that $10,000 more will be produced from December 12 to 31 of the year. This would make the total production to the last-named date as follows:

1881	$10, 628 81
1882	127, 753 09
Total	138, 381 90

With the exception of the Boston Consolidated, which received $1,331 for a test run of ore, the foregoing comprise the Bodie mines which have produced bullion during 1882. The aggregate is as follows:

Standard Consolidated	$1, 266, 417 36
Bodie Consolidated	500, 665 70
Noonday and North Noonday	215, 000 00
Bodie Tunnel	127, 753 09
Syndicate	83, 677 20
Boston Consolidated	1, 331 00
Wagener & Gillespie tailing mill	8, 300 00
Scattering, shipped by bank, &c	30, 000 00
Total	2, 232, 144 35

The production of Bodie district to December 31, 1882 (the last month estimated), is as follows:

1877	$797, 022 80
1878	2, 129, 732 58
1879	2, 556, 847 58
1880	3, 063, 699 13
1881	3, 172, 988 84
1882	2, 232, 144 35
Total	13, 952, 435 28

During the same period the dividends paid have been as follows:

Standard Consolidated	$4, 025, 000 00
Bodie Consolidated	1, 295, 000 00
Bulwer Consolidated	130, 000 00
Total	5, 450, 000 00

The Bulwer Company, while working but a small force of men during the year from the 700-foot level of the Standard shaft, has been enabled to pay a dividend of $10,000 per month from the profits of its mill, and from the accumulations from the same source the previous year.

Tioga Consolidated, adjoining the Standard on the north, has been worked throughout the year, or until the 1st of December. The 982-foot level was thoroughly prospected, and considerable ore found, but of low grade. The shaft-head attained a depth of nearly 1,100 feet when work was, as stated, temporarily suspended.

The Oro mine, which adjoins the North Noonday on the north, has been steadily at work all the year. The lowest level is at a depth of 720 feet. The vein is large, and has been found to contain chimneys of rich ore on each level below the 300-foot. Great hopes have been centered on this property, which, in the character and appearance of its ore, greatly resembles the Comstock bonanzas.

The Goodshaw mine has been worked a portion of the year, a level having been run at a depth of 750 feet without important results.

The Bechtel Consolidated, Pacific, and Boston Consolidated were also worked the early part of the year.

The following mines have been closed down throughout 1882: Blockbank, Summit, Double Standard, Belvidere, Dudley, Champion, South Standard, South Bodie, Glynn-Dale, Addenda, Governor Stanford, White Cloud, Booker, University, Jupiter, Maryland Consolidated, and Picher.

Homer district.—Next to Bodie, the largest bullion-producing district of Mono County has been Homer, which is 22 miles west of Bodie in the main range of the Sierras. The country rock has generally been pronounced a diorite, but this has been denied by some very good authorities. The district is entered from the eastern base of the range near the northwestern extremity of Mono Lake, through Mill Creek Cañon, which is a great chasm striking directly west about 5 miles into the heart of the range, on either side of which the mountains rise to a height of 1,500 or 2,000 feet. The mines have generally been found in the high points on the south of the main cañon. The principal property in the district is the May Lundy, which has a 10-stamp mill that can be run by either water or steam power, but which during the past season has been run by water-power exclusively. The mine is about 2 miles away from the mill, the two being connected by a wagon-road built at very considerable expense by the company. Owing to litigation no statement has been made officially of the bullion production, but the writer estimates it to have been about $350,000—$100,000 during the present year, and $250,000 heretofore, nearly all gold. The mine employed 50 or 60 men regularly, except during the severest portion of the winter, when it is impossible to transport ore.

The Homer, Little Emma, Gorilla, Mocking Bird, Silver Group, and other mines have been worked to some extent, the first named having been developed by means of tunnels to a greater degree than its neighbors.

At the north of Mill Creek Cañon is *Jordan district*, in which is situated the Detroit copper mine, on which about 1,000 feet of tunnels have been run within the past year. A smelter has been erected, tramway constructed, and a large body of copper ore said to have been developed, but at the present writing the mine is under attachment and closed down.

In the same vicinity are situated the works of the Mono Lake Hydraulic Mining Company. This company is in possession of a large tract of auriferous gravel. The company has been engaged during all of the summer in sluicing back from Mono Lake, which is the dump for the tailings, in order to get down to the bed-rock, and a channel 100 feet wide and over a mile in length has been sluiced out. At the present point of work the company has a bank 100 feet in height. Other large bodies of gravel are found at the base of the Sierras at various points in Mono County, and should the Mono Lake Company achieve success, hydraulic mining will receive a great impetus on the eastern side of the mountains.

Tioga district.—This district is also situated in the main range of the Sierras, about seven miles south of Homer district. The veins are found in a contact between slate and granite, or in close proximity to the contact in the slate. The great Sierra Consolidated Silver Company are the principal owners in the district, and have done a very considerable amount of work in the face of great disadvantages. The precipitous nature of the country has rendered it necessary to pack in everything—machinery, supplies, &c.—on the backs of mules, which is a necessarily slow and expensive method of transportation.

A tunnel of unusual size is being run into Tioga Hill by the Great Sierra Company, which is now nearly 500 feet in length. It is expected that this tunnel will intersect the ledges at a depth of 1,000 feet, and form at once a main working adit and drain for the mines. The tunnel is being pushed forward by means of an air-compressor and Burleigh drills. The company has connected itself with the outside world by means of a telephone line, which runs in one direction into the Yosemite Valley, and in the other to Lundy and Bodie, and a wagon-road is being constructed to the Yosemite Valley, nearly 40 miles distant. The ores are principally silver-bearing. The same company own claims in the vicinity, on Mount Gibbs, which are highly spoken of, but on which comparatively little work has thus far been done.

Blind Springs district.—The Blind Springs (or Benton) district is situated at the southern end of Mono County, and although it has been the scene of active operation it has been quite stagnant for two or three years. The Mono-Eureka Company, an Illinois corporation, is the only association which has been at work there during the present year. The rich ore which is found on Blind Spring Hill offers flattering inducements to capital, and the completion of the Carson and Colorado Railroad to this point will doubtless have a stimulating effect on the industry in 1883.

Patterson district.—This district, which is situated on the Sweetwater Mountains, twenty-odd miles north of Bodie in an air-line, has attracted a great deal of attention during 1882. It is found in what is probably the strongest and most extensive belt of quartz porphyry known to exist on the Pacific coast. The district is so young that thus far only one mill has been erected—a small 5-stamp affair—on the Kentuck mine, from which about $70,000 has been shipped during the year. The ledges are large and of free-milling silver ore. The principal work has been done on the Kentuck mine, which is developed by tunnels to a depth of about 300 feet. Below the lowest tunnel a winze has been sunk 80 feet, in which rich ore is found throughout.

The following interesting description of the Sweetwater Mountains, Mount Patterson, Kentuck mine, Silverado Cañon, also Sweetwater Cañon, and the prospects of the Sweetwater mines of this county were published in the Daily Bodie Free Press, June 28, 1882:

"The Sweetwater Mountains lie directly south and southeast of Antelope Valley, and extend from it to the Big Meadows. A broad valley bounds the range on all sides. The main ridges run north and south, though lateral ridges, with deep cañons on either side, run in all directions from a common center like the spokes from the hub of a wheel. In a direct line it is probably 8 miles from the bases of the range on the east to the west. The mineral-bearing portion of the range is that part of it to the east and south of the summit, the western and northern part being generally a grayish-white syenitic granite, with occasional belts of trachyte and porphyry, probably 4 miles wide and 6 or 7 miles long. The porphyry belt is bounded on the east again by granite. The range is penetrated from the east by several deep cañons, the most important of which, commencing at the north, are the Sweetwater Cañon, Silverado Cañon, and Ferris Cañon. These cañons seem to have been cut out by glacial action, without any other disturbance of the country, as the ledges can be traced, when not covered with *débris*, completely across the cañons, without break or shifting from what would naturally be their position. This will render it possible to work the great majority of the mines of the district by means of tunnels, thus saving the cost of expensive steam hoisting works. There is sufficient water in all the cañons to run all the mills which will ever be built there, which, with a plentiful supply of wood, will render the reduction of ores, all free milling in character, as cheap or cheaper than in any other district west of the Sierras. The district was named in honor of its discoverer, Mr. J. H. Patterson, who several years ago was attracted to it by the remarkably rich float quartz found in the plains and foot-hills below the high mountains. His work was confined mostly to the hills rising from Fryingpan Creek, whose source is near the most southern peak of the Sweetwater Mountains (now called Mount Patterson), in which locality the rich float was found in the greatest abundance. Quartz bowlders weighing several tons have been found in this cañon which yielded as much as $500 per ton. It may also be said that the ore at the southern end of the district shows a large proportion of gold, while at the north it is almost exclusively silver-bearing. Among the earliest locations made in the high mountains were several on Mount Patterson, in August and September, 1880, including the M. and M. and the Viola, on the same ledge, the Bonanza and the Saint Louis, on a parallel ledge, and the Oriental. The M. and M. and the Viola is a ledge which on the surface shows some very rich ore, from which the writer has obtained assays of from $225 to $395, the proportion of gold averaging about $50per ton. Outside the rich streaks the white quartz gives assays of from $10 to $25 per ton, nearly all in gold. The owners of the claims will do considerable work on them during the season. The Bonanza and Saint Louis ledge lies immediately east of the M. and M. and Viola, and is a large vein of low-grade quartz, so far as known. The Oriental is still east of the Saint Louis, and is another large ledge of apparently low-grade ore. The Lady Hayes and several other claims lie on the northern side of Mount Patterson, which slopes down toward Ferris Cañon. More work has been done on the Lady Hayes than on any of the others, and the vein shows high-grade ore. Directly across Ferris Cañon and about a mile north of the summit of Mount Patterson is the famous Kentuck Mine, which, up to the present time, is the leading mine of the district, and the only one which has a mill and is crushing ore. The vein has now been followed down to a depth of something over 300 feet from the surface. At the various points where cross-cut it has been found to be from 30 to 40 feet in width, with two or three veins of ore running through it of from 2 to 10 feet in width. The remainder of the ledge is made up of waste in the shape of vein porphyry, &c. Nearly all the ore thus far milled has been taken from the first tunnel level, about 50 or 60 feet under the surface. Seventy feet below the tunnel a short level has been run, in which there is not so great width of ore as above, but at the bottom of the winze, about 150 feet below the tunnel, the vein has been cross-cut, and about 6 feet of very rich ore is exposed. A lower tunnel is being run to strike the ledge 15 or 20 feet below the bottom of the winze, which will be completed within three or four weeks. Owing, doubtless, to pending litigation, the management have little to say about the yield of the ore, but from the best information to be obtained it is believed that it has yielded in the neighborhood of $90 per ton ever since the mill started. The mill, which has five stamps and two pans, is 3 miles away from the mine. The ore is packed by mules from one point to the other.

"On the same ridge as the Kentuck are a great number of other claims, but on none of them has any great amount of work been done or any very important development made until the Comstock series of ledges is reached, about 2 miles west. Following the croppings of the Kentuck to the north the ridge is reached which overlooks

"Silverado Cañon, in which is situated a group of mines which give every promise of becoming very valuable. The greatest amount of developing work on any of these mines has been done on the Homestake. The richest silver ore which has ever been found in the district, running as high as $3,000 or $4,000 per ton, has been taken from this mine. The ledges (there being two of them) cross Silverado Cañon, and work has been done on them on both sides. On the north side of the cañon a shaft has been sunk on the ledge 50 feet, the vein averaging 5 or 6 feet in width. A dump of magnificent ore has been taken out in prosecuting this work. The second ledge is about 2 feet wide and is also rich.

"The Silverado is a very handsome claim, on which they have sunk two inclines, and is a ledge west of and running nearly parallel with the Homestake. The Chrysolite and True Racket are also in this cañon. The ridge north of Silverado divides that cañon from Sweetwater Cañon, which at its western extremity cuts into what might be called the California Comstock, or Great Western series of ledges, the former being to the south and the latter to the north of that dividing chasm. The California Comstock is an immense ledge, varying in width from 40 to 100 feet, and as readily traced as a Chinese wall for a couple of miles in length. There are several locations along it, including the California Comstock, the North California Comstock, the extension of the North California Comstock, and others. The principal work has been done in the California Comstock and in the North California Comstock, which latter commences at the brow of the mountain and runs down the slope of Sweetwater Cañon. At the north end of the California Comstock a deep cut was run at the surface on the vein 26 feet long, and a shaft sunk some distance. Considerable good ore was found in doing this work, some assays running as high as $200 per ton. About 1,000 feet north of this point a cut has been run across the North California Comstock, showing the ledge to be 64 feet wide at that point. At the time of the visit of our reporter a tunnel had been run in about 30 feet on a streak of ore 6 feet wide, assays from which run from $15 to $140 per ton. This mine can be worked by tunnels to a vertical depth of 1,000 feet at least, and in the hands of a company understanding the working of large bodies of low-grade ores, like the Sierra Buttes Company, or the managers of the Homestake mine, in the Black Hills, would doubtless prove a very valuable property.

"The Bonanza is another large ledge on the south side of the cañon, which is very highly considered by those who have seen it. On the north side of Sweetwater Cañon, opposite the California Comstock, is the Great Western mine. This is a very remarkable mine in one respect, and that is that some great convulsion or action of nature has practically developed it to a depth of several hundred feet. The hanging wall was carried off doubtless by the glacier which cut out the cañon, and the ledge lies bare and exposed, like the famous Custer mine at Yankee Fork. A large number of cuts have been made in the ledge, all of which show good ore, and a tunnel has been run on it for a distance of 80 feet. A new contract for 100 feet of tunnel has just been given out and the men are now on the ground and at work. A couple of good-looking samples from the mine, which gave upon assay $117.43 and $161.17 per ton respectively. North of the Great Western is the Lookout claim, in which a very fine strike was made a few days ago. A little tunnel was run into the ledge and about 2 or 3 feet of ore was cut, of which 8 or 10 inches is very rich. The writer took a sample which assayed $510.76, all but $9.56 being silver. Other assays have run as high as $1,600 and $1,800 per ton. It remains to be seen what further work will develop.

"The prospects of the Sweetwater mines are certainly very flattering. The Kentuck and Great Western prove that the ledges go down and that they are better at depth than on the surface. The rich ore is probably in chutes and chimneys, but in the opinion of the writer there is enough of it to make a splendid milling proposition of a great many mines in the country. So far as his observations go there is not a hole on any vein in the district over 10 feet deep which does not show more or less rich ore. The mineral belt is immense in size, the formation is of the most kindly character, the district is about the same distance from the main range as the Comstock and Bodie, and between these two points the ledges are large and easily worked by tunnels, and the ore is as free as any ever discovered."

NEVADA COUNTY.

This county for many years past has yielded a larger amount of the precious metals than any other in the State. It embraces within its borders all the various kinds of mining carried on in this State. The mines are easy of access, being only a few hours' ride from Sacramento and only 10 hours from San Francisco by rail.

Most of the mines in this county are capable of being worked at all seasons of the year, owing to the immense water supply. Many of the hydraulic mines, however, have been partially closed down in consequence of the litigation going on between the miners and the farmers, and the residents of Marysville and Sacramento, who receive the tailings or detritus from the mines. During the summer months the *débris* from the hydraulic mines is deposited in the creeks, ravines, cañons, and rivers, and when the rains of winter come this *débris* is carried down the streams and rivers into the valleys below, which causes them to overflow their banks, depositing large quantities upon the agricultural lands adjacent to the rivers, as well as filling up the beds of the American, Yuba, and Sacramento Rivers, which threatens in time to submerge the cities of Sacramento and Marysville, and, if not stopped, it is feared will shoal the harbor of San Francisco.

The right to mine by the hydraulic process is now being litigated in the Federal courts at San Francisco, before the Hon. Lorenzo Sawyer, United States circuit judge.

Hydraulic mining.—It may truly be said that Nevada County is the home of the hydraulic miner. In no other place in the State, or, perhaps, in the world, has this class of mining been so extensively prosecuted, and brought to so high a degree of perfection as in this county. The extent of its gold-bearing deposits of gravel seems to be almost limitless. All the appliances that science, skill, and human ingenuity can devise have been brought into use in separating the precious metal from the auriferous earth. Immense streams of water under enormous pressure are projected against a mountain side, which literally cuts into the earth, displacing thousands of tons of rocks, earth, and gravel in an almost incredibly short space of time. Immense bowlders of a thousand pounds weight will jump and dance like so many marbles when the force of the stream is brought to bear upon them. It is this constant cutting away of the mountains and sending them down the streams into the valleys below that has caused the present conflict between the miners and the residents of the lower country.

From a topographical point of view no county in the State presents such extensive facilities for hydraulic mining as this. Extending nearly across the county, from northeast to southwest, is a high ridge or backbone, commonly called the "ridge." On either side from this ridge, from Eureka on the north to French Corral on the south, are located a large number of extensive gravel mines, many of which have been worked continuously for many years, and have produced many millions of dollars. On the south side of this ridge is what is known as the South Yuba River, it being the south branch of the Yuba proper, while on the north side is the Middle Fork of the Yuba, both streams running parallel to the ridge. It will thus be seen that the facilities for the disposition of *débris* from the mines on either side of the ridge are unsurpassed.

The deposits of gold-bearing gravel are mostly found low down on the sides of this ridge, on what might be called the table lands, or more properly under them, for these deposits are generally covered with earth, varying in thickness from 50 to 300 feet. A large proportion of this earth must be washed away before the gravel or pay dirt is reached. The richest portion of the gravel lies on the bed-rock, which is, undoubtedly, an ancient river bed.

Along this ridge are located the towns of Eureka, Relief Hill, Snow Point, Orleans Flat, Moore's Flat, North Bloomfield, Lake City, Columbia Hill, Badger Hill, San Juan, Sweetland, Cherokee, and French Corral. Nearly all of these towns have been brought into existence and kept alive by hydraulic mining, and if this branch of mining industry should be stopped, it would be a very serious blow to their prosperity.

North Bloomfield mine is situated on the South Fork of the Yuba River, 10 miles from Nevada City. It is a joint-stock corporation, and was organized August 7, 1866, with a capital stock of 100,000 shares, of the par value of $100 each. The mining property of the North Bloomfield Company consists of an aggregation of a large number of original mining claims, located very early in the mining industry of the State upon what is known as the Great Blue lode or gravel channel of California. It is sufficient here to say that they comprise about three and a half miles in length of this great gravel channel, so selected as to control two of the principal outlets or points where it can be worked or approached.

To acquire such a large number of original mining claims and consolidate them has been the work of many years, and a similar property cannot again be had.

The North Bloomfield mine is opened with a deep tunnel 10,500 feet in length, with three working or mining shafts. It is in complete and successful working order, fitted up with all modern appliances for working day and night, including an electric light of 12,000 candle power. It is running steadily, and when in full operation uses about 3,000 miner's inches of water (55 million gallons) each twenty-four hours, under a pressure of 400 feet, discharged through nozzles varying from 6 to 9 inches in diameter.

The Union mine, belonging to the same company, is situated about 3 miles below the Bloomfield, and has been worked for many years upon surface ground through a surface tunnel 2,000 feet long washing off top gravel. This work was suspended in 1877, as the water could be utilized to better advantage in the other mine. To work this mine properly will require a deep tunnel to be driven in connection with the Yuba Range gravel mine, which also belongs to the same company, and is situated 2 miles below the Union, on the South Yuba side. This mine occupies one of the principal outlets of the Great Blue lode. It has been worked upon top gravel at intervals for many years through surface workings. The bottom gravel can now be worked by a tunnel already driven 700 feet in length. This mine and the Union together form a very large property, and they can both be worked through the same deep tunnel. In order to permanently open it for deep working, a new tunnel about 1,500 feet in length will be required. As all of this property is held as a reserve, nothing will be done with it (unless by surface washings during wet seasons) for fifteen or twenty years, or more. It can be opened properly in two years, and is of great extent and value.

In the foregoing *résumé* of the various mines belonging to this company, a general statement is made that they comprise about 3½ miles of the main gravel channel, besides which the company owns and controls various creek and other mining rights.

In order that some idea may be had of the extent of the property of this company in mines, the following statement is approximately correct, viz:

Name of mine.	Total length of channel.	Length of channel worked out.	Length of channel yet remaining to work.	Total number of acres in each mine.	Number of acres belonging to this company.
	Feet.	*Feet.*	*Feet.*		
Union	3, 500	....	3, 500	213	213
Yuba Gravel Range	3, 000	....	3, 000	150	150
North Bloomfield	12, 000	2, 000	10, 000	1, 535	1, 535
Total	18, 500	2, 000	16, 500	1, 898	1, 898

It may be stated that in California but little importance is attached to the number of acres contained within the exterior limits of this class of mines. The linear length upon the main channel is relied upon in making estimates of their yield and value.

The gold-bearing gravel contained in the principal mines as above described—throughout their extent—will vary in depth from 75 to 400 feet or more. The width of the gravel channel on top will vary from one-quarter of a mile to a mile or more, and on the bottom from 350 to 1,000 feet or more. The ground is all well known and prospected. The various locations have been selected with great care, and with all the large facilities possessed by this company will certainly not be exhausted for thirty or forty years from now.

A very large amount of similar ground on the main channel, not now owned by the company, and having only a nominal value, lies in the rear of its mines, which are chiefly, as stated before, located upon the outlets of the channel. This ground can only be mined with profit in connection with and by an extension of the tunnels and works of the company.

In calculating the quantity of gold-bearing gravel in the mines of this company yet left, estimates vary from 100,000,000 to 150,000,000 of cubic yards, and the gold therein, based upon the experience of thirty years' mining in this channel, is estimated at from $35,000,000 to $40,000,000, with much more in the gravel, not now owned by this company, in the rear and adjoining its property, but practically controlled by it.

Water supply.—To extract the gold from this vast deposit in the mines of this company, within any reasonable time, which can only be done by the hydraulic process, requires large quantities of water, and much time and money have been devoted to acquire this much needed and necessary element. The supply in certain seasons of the year in the upper rivers and their tributaries is ample. But to make hydraulic mining profitable, it must be continuous and upon a large scale. In order to run continuously in these large mines, it became necessary to provide storage reservoirs in the high Sierra, commensurate with the large demand upon them for mining purposes.

Reservoir sites are quite limited in these high and broken mountains; in fact, but few exist in accessible locations. This company acquired, by purchase and occupation under United States patent, locations unequaled in the State, for the purposes required, and constructed stone dams across these mountain valleys at their outlets in the cañons in such a manner that one of them, the Bowman or Cañon Creek reservoir, has a capacity of 1,000,000,000 cubic feet of water, which, with several smaller ones connected therewith, contains about 2,000,000,000 cubic feet of water, or about 15,000,000,000 gallons.

The reservoirs were only completed late in the year 1878, having been several years in construction. They are drawn upon each year, only after the local supply from streams between them and the mines fall short by a canal 45 miles long. The two dams forming these reservoirs are built of stone; one of them is 100 feet, the other 50 feet in height. The canal from the main reservoir connects with all the company's mines. In addition to the 45 miles of main canals, there are several miles of connecting mining, lateral, and other canals, amounting in all to about 50 miles in length. There are also several distributing and receiving reservoirs in proximity to the mines, from which each mine takes its supply. The canals are constructed in the best manner possible, and supply the mines with an average of 30,000,000 to 50,000,000 gallons of water daily. This supply will certainly continue until all the mines are exhausted, and after that time indefinitely for irrigation purposes in the valleys and on the foot-hills below the mines, where the demand will by that time be illimitable for that purpose, thus rendering the water property of the company of great value after the mines are exhausted.

The expected use of this water for irrigation, and also as a supply of power, amounting to very many thousand horse-powers, for manufacturing purposes, induced the company to build in the present substantial and permanent manner the great dams forming its storage reservoir.

This vast water property has been acquired only by years of constant work and large expenditures of money, and at the close of 1878, when these large reservoirs were completed, this company finished a work commenced in 1865 and steadily prosecuted to completion.

In order to meet the financial requirements connected with these large mining and water properties, the shareholders have paid in gold coin, in shape of assessments, over $150,000, and there was also borrowed from some of the shareholders $500,000 upon first mortgage. Of this $500,000 so borrowed, $250,000 has been paid out of the net earnings of the company. The total amount expended by the company up to the close of 1882, including purchase of property, will approximate $2,000,000. The above amount, however, does not include money expended in opening up the mines after the tunnels were run, and is exclusive of interest upon assessments and gold derived from mining during progress of construction until dividends commenced in 1878.

The construction account, as well as all other accounts, except "working expenses" and "dividend" account, have been closed for some years; all expenses of every kind, including interest, forming the working expense account. In hydraulic mining, permanence and steady work will alone justify such a large outlay as has been made in connection with this property, and this company in selecting and purchasing mining ground and water right has been guided by these views only.

Since this mine has been owned and worked by the present owners, about $2,600,000 in gold has been extracted from it. From the fall of 1877 dividends have been paid to the shareholders amounting to $650,000. All the surplus earnings above that sum have been absorbed in construction, purchase of property, and payment of debts.

From January 1, 1883, forward until the mine is exhausted, the gross earnings will probably reach an average of $500,000 per year. The average yearly yield of large hydraulic mines varies but little, as they are not subject to the danger of pinching out, or becoming barren, or being flooded with water, as is the case with vein mines.

Owning, as the company does, the water stored in its vast reservoirs, with its main supply canals, so that the water can be used to the best advantage, and also having its mine so well opened where all the water can be utilized, the foregoing estimate is fully warranted.

The official accounts for the year 1882 have not yet been published. The results of the operations of that year can, however, be approximately stated as follows:

Bullion product		$375,000
Working expenses	$140,000	
Dividends paid	135,000	
		275,000
Surplus for the year		100,000

Mining was not commenced until late in February, 1879, as the reservoirs, being completed late in 1878, did not fill until the snow melted. Since January 1, 1880, the mines have run steadily most of the time. During a portion of the year 1881 this mine was closed by injunction, in a suit now pending, in which the right to mine at all by hydraulic process is in question.

In closing the report of this wonderful mine, it may be stated that this company received credit of having shipped to San Francisco the largest gold bar ever known to have been in existence. The weight of this bar was 511½ pounds, troy, and its value $114,000. The dimensions were as follows: Length, 15 inches; width, 6 inches; depth, 7 inches; containing 630 cubic inches of gold, and was worth about $19 per ounce.

Milton Mining and Water Company.—The capital stock of this company consists of 20,000 shares, of the par value of $100 each, of which 12,632 shares only have been issued. The mining property consists of a large number of original mining claims located early in the history of hydraulic mining in this State. The various claims of this company are located upon what is known as the " great blue lode " or gravel channel of California.

These mines are located about 15 miles below the mines of the North Bloomfield Company and upon the same channel. They comprise an extent of about 2½ miles in length of this great gravel channel, at different points on the same, so selected that it can be worked or approached most advantageously.

Like the mines of the North Bloomfield Company they are also situated on this immense ridge or divide, between the Middle and South Forks of the Yuba River. This section of the country is distant from San Francisco 160 miles, of which distance 145 miles is by rail and 15 miles by a good wagon-road, and any part of them can be reached in one day from San Francisco. Their elevation above tide-level is about 1,700 feet.

Badger Hill mine is situated about 7 miles below the North Bloomfield mines. It comprises the only outlet of the lower portion of the great blue lode upon the Middle Yuba River. It is, next to the North Bloomfield, the largest and most valuable mine in the district. Considerable mining has been done in it by previous owners in surface workings. To work it properly will require a deep tunnel, about 2,500 feet in length. It is held as a reserve and can be opened, when desired, in two years' time. It will probably not be required to open it for some time to come, for actual work.

Manzanita mine is situated about 15 miles below the Bloomfield mine. It is thoroughly opened by a deep tunnel about 2,300 feet long, is running steadily day and night, and has been running, through this tunnel, for the past four years, during the water season. Before it passed into its present ownership it was worked through surface works for many years. It is one of the largest, best situated, and most valuable of all the mines of this company.

Bed Rock mine, situated 2 miles below the Manzanita, belongs to the Milton Company. Like the Manzanita, it was also worked through surface workings for many years before it passed into present ownership. In order to open up and work this mine properly, it was necessary to run a deep tunnel 4,000 feet long, which has been done. This mine will probably not be worked steadily for some years to come or until the French Corral mine is exhausted, but will be ready to work at any time when desired. It is a very large and valuable property.

The Kate Hayes and Troy mine is situated about one mile below the Bed Rock mine. An undivided half of this mine is owned by the Milton Company. To work this ground by itself would require a deep tunnel about 5,000 feet long. It is held as a reserve, and will not probably be opened until the Bed Rock mine is exhausted. It will then be worked through an extension of its deep tunnel, some 200 feet long.

French Corral mine is situated about 4 miles below the Manzanita mine and comprises the lowest outlet of the great blue lode, upon the South Yuba River. This property is one of the oldest worked and best known mines in the State, as it has been worked for the past thirty years, and has proven itself to be one of the richest mines in California. Since acquired by present owners, a deep tunnel, 4,500 feet in length, has been run, and through it, since its completion, during a large portion of each year, mining has been steadily carried on. It is now running constantly, and will probably so continue to run until it is exhausted, which will require several years of steady work.

Shady Creek mines.—These mines are situated some 5 miles from the Manzanita mine, and comprise the bed and sides of Shady Creek for a distance of 2½ miles. This property, of which the company own three-quarters, is held as a reserve, to be worked when opportunity offers.

The foregoing comprise the principal mines of the Milton Company. There are also very many creek claims and other mining rights belonging to this company.

The various mines of the Milton Company comprise about 3½ miles in length of the main gravel channel. The following table, showing the extent of the Milton Company's mines, is approximately correct:

Name of mine.	Total length of channel.	Length of channel worked out.	Length of channel yet remaining to work.	Total number of acres in each mine.	Number of acres belonging to this company.
	Feet.	*Feet.*	*Feet.*		
French Corral	4, 000	3, 000	1, 000	130	130
Kate Hayes and Troy	1, 400	....	1, 400	20	10
Bed Rock	3, 140	640	2, 500	75	75
Manzanita	4, 200	2, 500	1, 700	150	150
Badger Hill	4, 000	....	4, 000	180	150
Total	16, 700	6, 140	10, 600	....	515

The gold-bearing gravel contained in the principal mines above described, throughout their extent, will vary in depth from 75 to 200 feet. The width of the gravel channel on top will vary from one-quarter of a mile to one mile, and on the bottom from 350 to 1,000 feet or more.

The calculation made of the amount of gold-bearing gravel in the mines of this company is very similar to that of the Bloomfield Company. The estimates vary from 150,000,000 to 100,000,000 cubic yards; and the gold therein, based upon the mining experience of many years is estimated from $15,000,000 to $20,000,000.

The immense amount of water necessary to the successful working of these mines by hydraulic process has been obtained by constructing large reservoirs, which, like those of the Bloomfield, required years of labor and vast outlays of capital. The principal reservoir of this company is the Rudyard or English, which contains about 850,000,000 cubic feet of water. This reservoir is situated on the Middle Yuba River, and is connected with the mines by a canal 75 miles long, and is formed by three stone dams, varying in height from 70 to 135 feet. The reservoirs of this company furnish from 30,000,000 to 40,000,000 gallons daily.

This company and the North Bloomfield, with the exception of the Eureka Lake Company, own and control all the available water supply in this large section of country.

In order to meet the financial requirements connected with this mining and water property the shareholders have paid in the shape of assessments $1,263,200, and there was also borrowed upon mortgage $300,000. The total amount expended by the company up to the close of 1880 will approximate $2,000,000.

Since these mines have been worked by the present owners about $3,250,000 in gold have been extracted. From the fall of 1877 dividends have been paid to the shareholders amounting to the sum of $650,000.

Prior to the present ownership and since 1850 several millions were extracted, but how much cannot now be ascertained. There is, however, little doubt that the gross product from them has exceeded $6,000,000.

The official accounts for the year 1882 have not been published. The results of the operations of that year are, however, approximately as follows:

Bullion product		$500,000
Working expenses	$250,000	
Bonds redeemed	75,000	
Dividends paid	90,000	
		415,000
Balance		85,000

Eureka Lake and Yuba Canal Company.—The property of this company is situated upon the great ridge heretofore noted, and consists mainly of valuable water rights, with an extensive system of reservoirs, aqueducts, &c., constructed for the purpose of furnishing water to be used at various points on the ridge before mentioned in the operation of hydraulic mining, and of certain tracts of mining ground, comprising some large and very valuable deposits of gold-bearing gravel. This property, formerly owned by M. Zellerback, is now owned by New York capitalists, the agents of which are Lazard Frères, bankers, at San Francisco.

The water rights of this company are the oldest on the ridge, comprising the now consolidated interests of several different water companies, whose various works were constructed from twenty to twenty-five years ago.

The business of this company is twofold in its nature, consisting, first, in selling water to other parties, and, secondly, in the use of water on its own mines. The great extent of the company's mining property, the development of which has only just commenced, bids fair to make this last-mentioned branch of business the more important of the two. The company's mining property comprises large tracts of land located at different points along and upon the course of the gravel range. The first and, at present, most important of these tracts is at and near Columbia Hill, covering about 2½ miles of channel. The following is a schedule of the several tracts belonging to this company:

	Acres.
Columbia Hill	1,445
Bloomfield	720
Snow Point	120
Relief Hill	220
Cook and Porter, ground	40
Two detached tracts at Cherokee	150

The Columbia Hill is a consolidation of what were formerly separate claims, whose combined area, now in a single tract, is 1,445 acres. Nearly all of this is mining ground. Within the limits of this property is a compact body of gravel, about 2½ miles in length, along the course of the channel. Its surface width, from north to south, varies from 3,000 to 8,000 feet, the average being about 4,000 feet. The depth of this gravel varies according to its position on the bed of the channel, being shallow on the border and deepening with the inclination of the rim rock. Its depth is also varied, independently of this condition, by the nature of the surface, being cut out and swept away, more or less, according to the ravines which have rendered the ground uneven.

Near the border of the deposit where mining has been done, the bed-rock lies from 50 to 100 feet below the surface of the gravel. The bed-rock of the deepest part of the channel has never yet been exposed within the limits of this property. If for the body of ground lying directly over the bottom of the channel we assume a width of 300 yards and a depth of 125 yards, and for the gravel on both sides an aggregate width of 1,000 yards and a depth of 30 yards, and for the whole a length of 4,400 yards, we obtain a sum of nearly 300,000,000 cubic yards; and as it is calculated that 1 inch of water will wash 7 cubic yards of gravel in twenty-four hours, this amount will require for its washing a constant employment of 4,000 inches of water for about thirty years.

A large portion of the surface of this ground has been worked by its various owners at different points during the past twenty years, using as outlets the several ravines that traverse the ground at either end of the property. The central portion being most remote, still remains intact. The results of these surface washings, even as far back as 1868, were very satisfactory and profitable, even when the owners were paying large water rates. In several instances large contracts have been made with parties who have worked immense quantities of this gravel, and the average yield has been from 3 to 4 cents per cubic yard, and even at this apparently small yield it paid, even after paying from 10 to 12½ cents per inch for water.

The present mining operations of the company at Columbia Hill consist in the working of the eastern portion of the property within the same area as that formerly worked by several individuals, but reaching a deeper level by reason of a reduction in the grade of the sluice. This has been reconstructed on a grade of 5¼ inches to 14 feet, the difference in grade amounting to over 100 feet in the length of the sluice. As this sluice is in future extended on or along the course of the channel, the height of the gravel bank above it will be steadily increasing until, at the head of the old diggings, where the original surface still remains, the bank will be 200 feet high. This sluice is 8 feet wide and 6,200 feet in length.

All of the above work, however, is, comparatively speaking, but surface washings, for in order to reach and wash the gravel in the bottom of this mine, it will be necessary to form an outlet to one of the branches of the Yuba River by means of a tunnel from 7,000 to 10,000 feet in length.

In the Columbia Hill mine the supply of gravel, supposing it all to be available, is sufficient for many years, say twenty-five, using 4,000 to 5,000 inches of water steadily. The supply immediately available is top gravel only, and may be considered sufficient, for, say, 10 years, washing it through existing outlets, and is capable of producing from $200,000 to $250,000 yearly, or $2,500,000 to $3,000,000 in all.

The following may be taken as a basis for estimating the value of this great gravel deposit:

The quantity of gravel in the deposit has been estimated at 300,000,000 cubic yards. The greater portion of this is top gravel, of which the estimated yield, based on experience, is 3½ cents per yard. There is no means of estimating the value of the deeper blue gravel except by its known value in other places. If the deeper blue gravel be assumed to have a value six times greater than the top gravel, and to form one-seventh part of the entire mass, the average value of all the gravel will be, say, 6 cents per cubic yard, or about $18,000,000 for the mine.

The Bloomfield mine adjoins that of the North Bloomfield Gravel Mining Company on the south. It is a tract of land containing about 720 acres of ground, lying on the south and east slope of the main lava-crested ridge, and is drained by Humbug Creek, a tributary of the South Yuba River. This property has not been much developed. Some washing of top gravel has been done near the North Bloomfield line, and extending thence southerly along the eastern rim of the gravel deposit, using as outlets the several ravines that drain into Humbug Cañon. It is probable that no very extensive operations will be undertaken until an outlet is provided by means of which the bottom gravel can be attacked.

Woolsey's Flat is from 5 to 6 miles from the Bloomfield property, measured along the supposed course of the channel, of which distance about 4 miles are covered by the heavy lava-cap that forms the crest of the ridge. This is one of four separate portions of the old channel—Woolsey's, Moore's, Orleans Flats, and Snow Point—once continuous, but now disconnected by deep ravines that have cut down into the bed-rock. It is a piece of ground about 2,000 or 2,500 feet along the ravine that it overlooks, and it has been worked off to bed-rock for a distance of, say, 1,000 feet or more. The channel deposit here carries very heavy deposits of clay in places 80 or 90 feet thick, which has been a serious drawback to mining.

In early days, the ground being easily accessible and very productive, it is said the claims paid good profits. Lately the ground has been mined by four companies, viz, the Blue Banks, Oriental, Boston, and XIX. All of these claims have paid well.

The Blue Banks mine has been extensively worked and has produced about $300,000. About one year ago a slide occurred which covered up all of the apparatus, and rushing down the hill, for a distance of one mile or more, caused an entire suspension of work. The mine was yielding abont $1,000 per day when this occurred.

The Boston mine has produced largely and is still a paying property.

On the opposite side of the ravine, which is the northern limit of Woolsey's Flat, is Moore's Flat, a similar portion of the said channel, but cut off on both sides by ravines.

At Moore's Flat the easily accessible gravel has been pretty much, though not entirely, worked off to bed-rock; there remains, however, an undetermined width of channel lying along and under the hill, for a distance as yet unknown, but probably containing a large amount of gravel.

Snow Point is a similar location 2 miles from Moore's Flat. A little mining is being done here, but no very extensive operations are likely to be undertaken until a deeper tunnel is driven.

Relief Hill is situated on the opposite slope of the main ridge. It resembles Woolsey's Flat in many respects, being a portion of another branch of the channel, cut off on the one hand by a deep ravine, Logan Cañon, and, on the other, disappearing with a descending grade under the lava-covered ridge. Along the face of the hill, overlooking the ravine, the ground has been extensively worked. There are some valuable mines here, some of which have advanced their workings as far into the hill as the heavy beds of pipe-clay and the overlying and constantly deepening cover of the surface dirt will permit. The owners of some of these mines are drift-mining, and the bottom gravel is said to be rich enough to make this method of working profitable.

The water supply of this company is the most extensive of any company in the State. It consists of a system of ditches aggregating in length about 200 miles, conveying the water from various sources of supply high up in the mountains; a series of storage reservoirs, three or four in number, located at an elevation of 6,000 feet above the sea-level, holding and furnishing water during the summer months when the supply of the streams is diminished or cut off; also a number of distributing reservoirs, so situated near the points of delivery that they may receive the water from the ditches, and distribute it as desired for use.

The principal and largest of the storage reservoirs is the Eureka, or French Lake, a natural lake across whose outlet a dam has been raised producing a reservoir of large capacity. The next is the Fancherie, lying about 600 feet below and about 2 miles from the Eureka. The third and fourth are the Weaver Lake reservoirs, which are situated on one of the tri butaries of Middle Yuba.

Of all these reservoirs the French is the most important. It was originally a mountain lake of great depth, and contained a large body of clear water. A substantial dam built of blocks of granite with a facing of plank was constructed across its outlet in 1858–'59. This dam is about 250 feet long from bank to bank of the gorge in which it is built. Its base measured along the course of the stream is 89 feet; its height, 68½ feet above the foundation, and 62½ feet above the bottom of the outlet, which is an arched sluiceway, traversing the structure, the discharge being regulated by gates. The area of the reservoir when full is about 337 acres, and its estimated capacity at 661,000,000 cubic feet.

The Fancherie reservoir forms an area of 139 acres, with an estimated capacity of 170,000,000 cubic feet. The Weaver Lake reservoirs also have large capacities for storing water for use in the summer season.

The aqueducts, consisting of ditches, flume, or pipe, aggregating in length more than 200 miles, are capable of delivering at various points 8,800 miner's inches in wet weather, or 4,600 in dry weather, each inch amounting in twenty-four hours to 2,260 cubic feet. This company also have sixteen smaller or distributing reservoirs at various points along the ridge. The cost of these reservoirs and aqueducts cannot be accurately ascertained, but it does not fall below $1,250,000.

The average annual expenses of the company's ditch and water property is about $85,000. Considerable pains have been taken to show the vast outlay of money in opening and equipping these large mining properties, owing to the fact that public attention in California has been drawn to them so largely in the past two or three years.

In view of the fact that this so-called ridge is the largest deposit of gold-bearing gravel ever known or discovered in this State, and probably in the world, it may be interesting to say something concerning its probable origin or formation. The following is from a scientific gentleman who examined this section a few years ago:

"The nature and formation of these gravel beds is now thought to be pretty clearly understood. It may, however, be said that the high gravel deposits not only of this ridge but along the western slope of the Sierra are believed to mark the course and occupy the channels and furrows of ancient rivers, which, with their tributary streams and ravines, once formed the drainage system of the country, that system no doubt in many respects resembling the present. Its rivers were large and flowed in deep narrow gorges with precipitous sides and steeply descending grades; in places the streams must have occupied broad cañons with gentle grades, sometimes forming lake-like expansions.

"Owing to agencies which need not be discussed here, but by processes closely analogous to that by which our present rivers have become choked with excessive *débris* from the hydraulic mines, the troughs of these streams were filled to overflowing with immense deposits of gravel brought down by floods from the higher country. This filling up of the river beds compelled the flowing water to seek other channels, the final result of which is our existing system of drainage. Meantime the gravel flood was succeeded by volcanic activity, during which great volumes of lava and volcanic tufa poured down the slope of the Sierra following and covering the gravel deposits, sometimes to a great depth, and forming the great sheets of volcanic material which now covers so much of the surface of this and other ridges of the main range.

"Working upon this material modern erosion has carved out the present surface of the country with its much deeper river beds and system of tributary cañons, ravines, and gulches. The general level of the water channels of the present drainage system is so much lower than the old that where the bed of the river formerly was is now in some places the dividing ridge between the modern streams; and from the mass of detritus that was deposited in the troughs of the ancient rivers have since been carved the ranges of gently sloping and rounded hills that now in part form the crests of the ridges.

"The bodies of lava that were once deposited on the lower or western portion of the ridge have been mostly removed again, exposing in places the gravel that it covered. The gravel, too, has suffered much erosion, and in places has been partly or wholly washed away, so that what was once a compact body of approximately uniform depth is an uneven mass, forming ranges of hills, hundreds of feet high, separated by deep ravines.

" Higher up, or farther east, on the ridge, where the process of denudation has been less active, the lava still lies in heavy bodies, covering the gravel channel in places several hundred feet deep.

" The material deposited in this ancient channel is composed mainly of rounded and water-worn masses of quartz, slate, granite, and indeed all the rocks of the Sierras, varying in size from huge bowlders of many tons weight to small pebbles and fine sand, accompanied in places by occasional beds of very tenacious clay. Fossil wood is of frequent occurrence. The higher portions of the deposit, commonly called top gravel, form a not very compact mass, sometimes white, but generally of a yellowish or reddish brown color, due to the oxidation of the iron. The lower portions in which the oxidation of the iron is complete have a blue or green tint. The bottom gravel is generally a very compact and finely cemented conglomerate, often requiring the use of much powder to disintegrate. The blue gravel at the bottom varies from a few feet to over 100 feet in depth; the top gravel, from 50 to several hundred feet, according to the height of the surface ground above the bed-rock.

"As these gravel deposits have proceeded from the disintegration of gold-bearing rocks, the entire mass is more or less auriferous. The gold, however, is not evenly distributed. The top gravel, though perhaps more uniform in value, is comparatively poor, while the richest is generally within a few feet of the bed-rock, often occurring in pay streaks, which, though they follow in a general way the bed of the channel, change their course capriciously, as the currents depositing them turn one way or another. In some cases where the bottom dirt is exceptionally rich, and especially where the gravel is covered with lava so deeply that hydraulic mining is impracticable, the process of drift-mining is employed, tunnels being driven in on the bed-rock, and the rich dirt so mined out without disturbing the top; but since in hydraulic mining it is impossible to reach the bottom gravel without first removing the top, the entire deposit, when worked by that method, must be subjected to the process of mining and washing.

"Enough has been said to show the magnitude of this immense deposit of gold-bearing gravel, and the vast expenditure of money already made to make it productive; and if the right to mine this great deposit should be determined in favor of the miner, or if other means should be adopted for the disposition of the *débris*, there will within the next 40 or 50 years be produced probably not less than $100,000,000 from this deposit of gold-bearing gravel."

There is but very little drift mining in this county. The Derbec blue quartz mine, situated on the gravel ridge, and adjoining the North Bloomfield mine on the north and east, is quite a noted mine. The gravel is hoisted by machinery through a shaft 466 feet in depth. Last May a tunnel was started in Humbug Creek at a point 4,500 feet from the old or No. 1 shaft. When completed, this tunnel will drain the lowest part of the mine yet worked. There are 2,000 feet run, all of which is through the North Bloomfield ground, and 800 feet more will connect it with shaft No. 2, which has been sunk on the line of the tunnel about 2,000 feet from shaft No. 1. This property has produced well, and will do so for many years to come.

Quartz mining.—The quartz-mining industry of this county is being prosecuted with very satisfactory results. There are about thirty-seven quartz mills, nearly all of which have been in operation during the past year. The total amount of ore worked by these mills during 1882 was 1,110,000 tons.

Grass Valley has been the most important point in Nevada County for quartz mining for several years past.

The Idaho, the principal mine at this place, is still producing large quantities of bullion. The mine is being worked to a great depth, consequently the expenses are correspondingly greater. During the past year the company made a contract with the South Yuba Water and Mining Company, whereby the latter agreed to furnish water to the company for motive power on terms considered to be favorable to the interests of the Idaho Company. In making this change of power the trustees had in view the increasing quantity of wood consumed, and as greater depth is attained this increase of consumption would constantly keep going on in the future, even at a greater ratio than it has in the past; and believing this change would meet the approval of the company, steps have already been taken to carry it into effect. Plans are now being prepared and part of the iron for pipes is already ordered, and the work will be pushed ahead as fast as possible, but as it is quite a heavy job it will be well along in the spring before it is completed. As the work is now all below the 1,000-foot level, and the ore below that point has to be raised by compressed air to that station, it will be necessary to add another compressor to the works before the close of the year 1883.

The quality of the ore has fallen considerably below what it was last year, and has produced a corresponding shrinkage in dividends; and from the present appearance of the mine, hopes cannot be entertained of any increase of dividends for the ensuing year over that of the year just closed.

Within the past year the 1,100 drift has been extended to the distance of 1,044 feet from the incline, but the last 100 feet have been through barren ground, and it may be considered that the pay chute is exhausted in this level, and the backs above this point are also worked out. The 1,200 drift is in 860 feet from the incline. This has been quite a poor drift most all the distance. The stopes above this drift are also quite poor, but some improvement is expected, as good ore was found in the 1,100 drift ahead of the present stopes. The 1,200 stopes are worked through to the 1,100 level drift for a distance of 700 feet from the incline. The 1,300 level drift is in 422 feet from the incline. The ledge in this drift will average about 2½ feet in thickness and of fair quality. The ore in the stopes above the drift is also of about an average quality. The incline is down 221 feet below the 1,300 level, or a vertical depth from the surface of about 1,491 feet. They are now opening out the station for the 1,400 drift. There is a small ledge in the incline, which shows gold occasionally, but there is not much profit in it at present.

During the year the company worked 27,539 tons of ore, which gave a yield of—

31,605½ ounces of bullion	$554,293 23
5$\frac{1}{10}$ tons of sulphurets	4,713 26
From tailings and slime	8,516 53
Specimens	56 00
From working slime sold	103 50
	568,572 52

The above shows an average yield of $20.64 per ton. The cost of mining and milling was $9.83 per ton.

During the year 1882 the company paid fourteen dividends, amounting to $263,500 and carried over a surplus of $35,000. The dividends of this mine for the last fourteen years aggregate the magnificent sum of $3,365,050. This has been the most productive quartz mine in the county, and to all appearance will continue to produce for many years to come.

Providence quartz mine, located near Nevada City, in Nevada Township, is one of the great properties of the State, and is likely to remain as such for many years to come, as the explorations have been carried out on a large scale, and there are reserves of ore that will take a long time to work out, independent of new developments. The mine is opened to a depth of 1,100 feet, and the total length of drifts, as per recent measurement, is 15,720 feet, or nearly 3 miles. The average width of the vein is about 6 feet, but it shows in places the enormous width of 52 feet. The quartz contains a considerable amount of sulphurets, the average being about 7 per cent.

The mine is situated on the south bank of Deer Creek, about one mile west of Nevada City. The veins run north and south, or rather deviate a little from those points to the west and east, and have an eastern dip. The location extends 6,000 feet south of Deer Creek, which embraces an amount of ground that is practically inexhaustible. Very little ore has ever been taken from the mine below the 700 level, and there are large quantities of good ore still left above this level.

The 20-stamp mill has heretofore been supplied with ore from the 100-foot level, which, opening on the banks of Deer Creek, is also used as a drain tunnel. The lode seems to be incased between granite and slate, and at points where its extreme width occurs contains great masses of decomposed quartz and granite. Iron and copper pyrites are found in small quantities.

The new mill of this company, recently erected, works admirably. It and the hoisting works are located on the steep hillside above Deer Creek, which locality gives every facility of fall, so that from the time the ore is brought to the surface and goes through the various stages of crushing, amalgamating, and chlorination, it is constantly descending from point to point with scarcely any handling, except by machinery.

The mill, which contains 40 stamps, is connected with the hoisting works by a tramway over which the loaded cars are taken. These cars drop their loads of ore on inclined gratings, called "grizzlies," through which all the quartz and fine stuff not exceeding 2 inches in size falls into the self-feeders on the floor below, one of which is placed in connection with each battery of five stamps, and feeds the battery automatically. Such quartz as will not go through the grizzlies is thrown into rock-breakers, where it is crushed. One man is required, during the day, to attend the rock-breakers, two in number, and this is all the manual labor required to feed 40 stamps, as the self-feeders will do that work better than it can be done by hand.

When the tailings (crushed quartz) leave the batteries they pass over the usual aprons and inclined sluices, and from thence on the Frue concentrators, sixteen of which are used in the mill, and which have been demonstrated to be the best invention yet made to separate the sulphurets from the sands. All the work of attending the sluices and concentrators below the batteries is done by one man, so that in this large mill of 40 stamps all the ordinary manual labor required is performed by two men. The sulphurets are taken from the concentrators as often as required, and removed to a drying room adjoining, and from thence run into the chlorination works, where they are worked in the usual manner and both the gold and silver secured.

The power used to drive the mill is water, 100 inches, brought from the north side of the creek, through a 15-inch pipe, and under 390 feet pressure. This is discharged through a 1¾-inch nozzle upon a Collins hurdy wheel, 6 feet in diameter, which drives the whole machinery with the greatest ease, and apparently with plenty of power to spare. There is an automatic regulator, which lets on more or less water, as may be required, when less or additional power is required by the rock-breakers. The mill throughout is a marvel of simplicity, convenience, and neatness, and may be said to run itself, as the visitor going inside sees no evidence of the driving power, which is in a little box in an extension of the building, in the hillside below, and only one man in the battery room.

This mill, with its cheap power, seems the perfection of quartz milling, as hand labor is almost entirely dispensed with, and its economy is seen in the fact that the cost of milling quartz is reduced to 55 cents per ton, including the wear and cost of keeping up the works. This is the cheapest milling done in the State.

The Sierra Buttes and Plumas Eureka Companies mill their ore for the same or less figures, but they own their own water, while the Providence Company buy theirs; therefore, the latter can claim to be doing their work at the least cost.

So entirely satisfactory has been the use of water by the Providence Company in milling, that it has been determined to also introduce water for hoisting and pumping purposes, and that will be done during the coming season. After seeing the success and economy of the Providence Company's experiment with water-power, the project of introducing the same power in this district by the Idaho Company gives promise of most important and beneficial results in stimulating quartz mining and reducing the expenses of the business.

The Murchie mine in this county has been quite a steady producer of bullion for several years past. The shaft has attained a depth of 720 feet, from which 11,741 feet of level have been run. The average width of the ledge is 5 feet, lying between granite walls. A 10-stamp mill, attached to the mine, is kept constantly running, working 25 tons of ore per day. The ore contains about 4.5 per cent. of sulphurets, which is also worked at the company's works. The ore is improving in value as depth is attained.

New York Hill mine is situated at Grass Valley in this county and is quite an important mine. It has been worked to a depth of 1,300 feet on an incline. Thirteen separate levels have been opened, with drifts ranging from 100 to 1,000 feet in length, the average being about 400 feet each way from the shaft. The vein or pay streak, incased in very hard rock, is about 8 inches thick. The mine is supplied with steam hoisting and pumping machinery, and turns out 20 tons of ore daily, which yields an average of $25 per ton. This company has no mill or reduction works of any kind, but sends all the ore to custom mills for reduction; notwithstanding, it pays regular dividends and is likely to continue to do so. This mine employs about 75 men.

Canada Hill quartz mine is situated on the west bank of Little Deer Creek, about 1½ miles from Nevada City. The claim consists of 3,260 feet, 1,760 feet of the original location, made in 1851, running from the bank of Little Wolf Creek in a southerly direction, and 1,500 feet subsequently located by L. Chamont & Sons, running from the south end of the first location. The vein runs almost north and south.

The shaft, or, more properly, incline, going down at an angle of 20°, is down to the depth of 750 feet, and is still being sunk. A drain tunnel, 1,700 feet in length, receives the surface water, also that of the pumps in the mine, saving 250 feet of pumping to the surface. Drifts running north and south from the incline every 60 feet below the drain tunnel have an aggregate length of over 3,000 feet. The vein is from 15 to 18 inches in width. The country rock is granite and slate. The average number of tons extracted daily is about 20, or 600 tons per month. This company own a 10-stamp mill, situated about 100 feet from the hoisting works, which is run by steam generated in the boilers of the hoisting works, and conducted to the engine of the mill through a 3-inch pipe, this being inclosed by a 6-inch pipe, into which the steam from the hoisting engine is exhausted. The mill contains all the latest improvements, such as rock-breaker, self-feeder, Frue concentrators, &c. The ore from some parts of the mine is quite heavily sulphureted, containing on an average 3 per cent. saved by 4 Frue concentrators, the value of the sulphurets ranging from $100 to $260 per ton. The value of the ore per ton could not accurately be ascertained, but is sufficient to pay regular dividends every month. An analysis of this ore showed quartz, sulphur, iron, lead, zinc, lime, arsenic, tellurium, gold, and silver. This mine, considering its size, is one of the most economical and cheaply worked of any in the State, the entire cost not exceeding $8 per ton.

The Spargo mine is situated on Deer Creek, just above the Providence mine, and contains 1,700 feet on the vein, running in a southerly direction and carrying a fine grade of ore. The vein, which is in granite formation, is about 20 inches thick, and is taken out by means of tunnels, of which there are three run in on the vein. From 7 to 10 tons are taken out daily, which is sent to the company's mill and chlorine works. The ore contains about 2 per cent. of high-grade sulphurets.

Pittsburgh mine is situated about 1½ miles from Nevada City, in Gold Flat district. It contains 3,000 feet of ground covered by a United

States patent. The works consist of first-class hoisting works, pumping engine, 10-stamp mill, 5 Hendy concentrators, Knox pans, &c. No active work has been done under ground for about one year, with the exception of the drain tunnel, which is being pushed rapidly ahead; and when finished in the spring of 1883 will drain the mine to a depth of 300 feet, when active operations will be commenced, which will give employment to about 60 men.

Consolidated Wyoming Gold Mining Company.—The mine is in Nevada district, and is a consolidation of the Wyoming and Ural mines. It has been developed with an incline 700 feet in depth, and 9,250 feet of drifts. The ledge is 2½ feet in width, with granite hanging wall, and slate foot wall. The average percentage of sulphurets in the ore is about 2¾ per cent. The company has a 16-stamp mill, 8 Frue concentrators, all run by water-power. The mill crushes 24 tons daily, all of which are furnished from the mine. About 45 men are constantly employed.

Merrifield mine adjoins the Providence on the north and is fairly booming with business. The mine is opened to a depth of 900 feet, and has drifts to the extent of 8,000 feet already run. It produces about 55 tons of ore daily, which is high grade, and contains about 6 per cent. of rich sulphurets. A 30-stamp mill with 12 Frue concentrators is attached to the mine and kept in constant operation, giving employment to a large number of men. There is also a furnace connected with the mill, capable of roasting 100 tons per month, preparing the sulphurets for the chlorination process.

There are a great number of mines in this county, both gravel and quartz, which are being worked, some with remunerative results; others are simply prospecting and doing dead work, hoping and expecting to strike something to make them pay.

The following are some of the mines which have been worked during the year in a desultory manner, although some of them are producing considerable quantities of bullion, viz: Maryland, Allison Ranch, Iron-Clad, Empire, Menlo, Scotia, Sebastopol, Baltic, Centennial, Washington, Tribute, Town Talk, Champion, Mountaineer, Deadwood, Saint Louis, Mount Auburn, Banner, Eagle, Souchets, Illinois, Quaker Hill, True Blue, Buelon, Ocean Star, Alta, Alpha, Buckeye, and several others.

PLACER COUNTY.

Placer County is bounded on the north by the counties of Yuba and Nevada, and on the south by Sacramento and El Dorado. It extends from the Sacramento River on the west to Lake Tahoe on the east. From the Sacramento River to Auburn, a large, low belt of country which extends to high foot-hills, extensive fruit orchards have been planted which have yielded largely, and have proven very remunerative. The eastern portion of the county is very rugged and mountainous. Quartz mining is principally confined to the vicinity of Auburn.

The Addie quartz mine is situated near Auburn and has been idle for a year, as have been also the Alhambra, Alabama Extension, and Alabama Consolidated, all quartz.

The Almatah quartz, owned by Spear & Co., is situated 1 mile northeast of Ophir, and is the west extension of the Good Friday. It was opened in 1863 and a shaft 115 feet deep sunk on the ledge. The lode is rich in copper ore, the copper belts intersecting the quartz at various places. The mine is at present idle.

Auburn and Rock Creek Quartz mine, owned by J. W. Foulkes & Co., idle. Belleview, idle.

Belmont quartz, C. L. Strong superintendent, situated 4 miles northwest from Ophir on the Morning Star lode. It was opened in 1882. A strong vein from 3 to 4 feet wide is well developed. A 20-stamp water-power mill is being constructed. Twenty men are employed and the future prospects are good.

The Bowles and McBride River claim is situated on Manhattan Bar, on the American River, and is owned by J. T. Bowles. The gravel is hoisted from the river bed by means of derricks, and can only be worked in the summer time. The mine has produced considerable bullion.

The Bruce quartz, owned by B. Bruce, is situated 1 mile west of Auburn. Two shafts 100 feet each and one 60 feet deep have been sunk. The rock assays $19 per ton. Four men are employed.

The Back Action quartz mine, owned by Craig Fulweiler, Boggs and Adams, is the east extension of the Ohio and Gold Blossom. This mine has been worked for two years in the way of prospecting. Two men are employed.

Conrad quartz, owned by Frank McCann, is situated on Duncan Hill. The pay ore is irregular. Two men are employed.

Cooper and Nutting quartz: Idle.

Crandall quartz: Idle.

Dicker quartz, J. P. Cogswell superintendent, is situated between Auburn and Newcastle. This mine is at present being pumped out and prospected.

The Hathaway quartz is situated near Ophir and owned by James Butts. There is a 5-stamp steam mill on the mine. Five men are employed.

Hunter quartz, T. J. Hunter superintendent. This mine is situated on Duncan Hill, and was opened in 1880. A tunnel 150 feet long has been run, and a 65-foot shaft with two levels of 55 and 140 feet. The rock milled at a custom mill has paid $60 per ton. The proportion of silver to gold is 135 to 100. Five men are employed.

Julian quartz, situated near Newcastle, C. B. Davis superintendent. This mine has been worked regularly for many years. It was purchased by a New York corporation a few years ago. Work was suspended November, 1882. There is on the mine a 15-stamp mill.

Mammoth Bar, W. G. Davis superintendent, situated on Mammoth Bar, South Fork of the American River. The bed of the river and the old channel of the bar are being worked energetically when high water does not interfere.

Martin quartz: Idle.

Morning or Bullion quartz, owned by N. Marving, is situated 1 mile north of Ophir, on the same lode as the Belleview. This claim was opened in 1882 and a shaft 150 feet deep sunk on the ledge. The rock, which is very regular, assays $15 per ton.

Mina Rica quartz, J. W. McCullough superintendent. This mine is situated 1¼ miles east of Ophir; has been worked for two years, in the way of prospecting. A shaft 275 feet deep has been sunk, and three levels run 400, 200, and 175 feet in extent. A 5-stamp water-power mill is being constructed. Rock yields $17.75 per ton. The silver is in proportion to gold as 5 to 1,000. Seven men are employed.

Morning Star quartz, owned by Hawkings and Reardon, is situated 4 miles northwest of Ophir, and on the same lode as the Belmont. The claim has been worked four years, and the rock crushed by a 10-stamp water-power mill. Steam hoisting works are being constructed. A shaft 260 feet deep has been sunk, and three levels 75 feet each have been run. Six tons of rock are crushed per day with 5 stamps. The rock yields $45 per ton. The bullion is worth $15 per ounce. Five men are employed.

The Laird gravel mine, J. Laird superintendent, is situated 2½ miles southeast of Pino. This mine has been worked irregularly since 1850. The gravel is raised from an old river channel by means of a hydraulic elevator, 300 inches of water from the Bear River ditch being used for this purpose. The gravel is quite rich and pays regularly. There is a large body of it left which can be worked profitably. The total product of the claims, of which this is a consolidation, is estimated at $1,000,000. From five to twenty men are employed.

Lee's gravel mine, owned by George Lee, is situated 3½ miles east of Rocklin. Three men are employed drifting on an old river channel.

Hoadly gravel.—Three men are employed drifting on the same channel.

Newcastle Gold Mining Company (see Yankee Hill mine).—The Nutting and Hooper quartz is being prospected under a bond.

Ohio and Gold Blossom, P. C. Du Bois superintendent.—This mine, situated 2½ miles northwest of Ophir, was first opened in 1858, and reopened in 1880, and in 1882 sold to the present owners. A shaft has been sunk 100 feet and two levels run 60 and 400 feet. The vein is 2½ feet wide and the rock yields $30 per ton. A 10-stamp water-power mill and a 50-foot reverberatory furnace are being constructed. Twenty-seven men are employed. The lode has been well prospected with good results.

Old Salsic quartz: Idle.

Pelton quartz: Idle.

Robinson & Co. quartz is situated near Ophir. The owners are sinking a shaft with a view to opening the mine.

Rocky Point gravel, W. G. Hughes superintendent. In this mine, situated at Rocky Point on the South Fork of the American River, the gravel of an old channel adjacent to the present river bed is being drifted and hoisted up a slope by water-power. Twenty men are employed.

Sacramento gravel, owned by Craig & Co., is situated 3½ miles east of Rocklin. This claim was recently opened with good prospects. It contains an extensive body of good gravel which it is proposed to hydraulic. Ten men are employed.

Shipley (Morning Star) Shurtliff quartz, owned by A. Shurtliff, is situated on Duncan Hill, between Ophir and Auburn. This mine was located in 1876, and has been worked regularly ever since. A well-defined 2-foot vein has been developed. The rock assays $25 per ton. Four men are employed driving a tunnel into the lode.

Saint Lawrence quartz, owned by C. A. Reed, is situated one-half mile north from Ophir. Four men are employed sinking on the lode. The rock is worth $15 per ton. The proportion of silver to gold is 1 to 15. The owner proposes to put up a mill.

Saint Patrick Consolidated quartz is situated near Ophir; considerable money has been taken out. Shafts have been sunk 75, 150, and 170 feet deep. The rock assays from $30 to $80 per ton. This mine and the Crater are on the same lode, and are among the list of paying mines in the county. On the Crater considerable work has been done and machinery put up.

Slate Range or Valley Forge, owned by William Werry, is situated 4 miles northwest from Auburn, and has been worked regularly six years. The total production has been $85,000.

Reed quartz, owned by C. A. Reed, is situated one-half mile northwest from Ophir; considerable prospecting has been done and a 4-foot vein developed.

Peter Walter quartz, owned by Stephen Quinn, is situated one mile northeast of Ophir, and has produced considerable bullion. It is now being prospected.

Yankee Hill hydraulic mine, James Wilson superintendent. This mine is situated 1½ miles east of Pino, and is owned by the Newcastle Mining Company. The ground is hydraulicked with water from the Bear River ditch. There is enough gravel to be profitably hydraulicked for six years.

Whitmore hydraulic mine, owned by Whitmore & Co., is situated near the North Fork of the American River, above Poverty Bar. It is a seam gravel mine; 150 inches of water is obtained through a ditch one-quarter mile long. The total production is estimated at $60,000. Two men are employed.

Centennial Drift mine, now known as the Napoleon, D. M. Burns superintendent, is situated 1¼ miles south of Yankee Jim's, on the Forest Hill divide. The mine was opened in 1858 by sinking a stope to the bed-rock, and subsequently abandoned. It was reopened in 1876 and prospected for four years. The present owners, an incorporated company, purchased the mine in 1881, and have continued work regularly since then. A steam hoisting engine is used to draw the gravel up a 180-foot slope.

Imperial Mining and Fluming Company, A. W. Hawkins superintendent. This mine includes 6 miles of the bed and tailings of Shirt-tail Cañon, commencing at the junction of this cañon with the North Fork of the American River. In the early days of mining the bed-rock of the cañon was worked profitably in claims of 16 feet square, but owing to disadvantages arising from unexpected rushes of water and the want of any general system of working the bed-rock was not stripped of its gold except at intervals. Subsequently the bed of the cañon has been filled, to a depth of 25 feet with the tailings from the hydraulic and drift mines of Yankee Jim's, the Brushels, Wisconsin Hill, Grizzly Flat, King's Hill, and Georgia Hill; these tailings have been thoroughly disintegrated and may be easily worked. The present company purchased in 1881. A bed-rock cut 8 feet wide has been run for a distance of 800 feet up the bed of the cañon, commencing at the falls near the junction of the cañon with the river. The cut will be continued up the cañon at the rate of 1,000 feet per year. The depth of the cut at the present time is 15 feet; 35 men are employed.

The Dead Horse mine, situated near Yankee Jim's and owned by O. W. Henderson, was opened in 1871 as a hydraulic claim and has been worked regularly since then. The mine has 1½ miles of ditch, with a capacity of 350 inches. There are 4,000 feet of pipe on the mine. The total production has been $500,000; expenses $35,000. Ten acres of ground still remain, which can be profitably worked. Five men are employed.

Gilbert Brothers' hydraulic mine at Yankee Jim's was opened in 1863 and worked regularly since. Ten acres of gravel remain. Water is obtained from the Union and Miner's ditches. Product, $100,000; expenses, $60,000. Four men are employed.

Georgia Hill hydraulic and drift mine, owned by Charles Trafton, near Yankee Jim's, adjoining the Centennial, was opened in 1854 and hydraulicked until 1877, when work was stopped on account of scarcity of water. A tunnel is being driven for the purpose of drifting. The mine owns two ditches, each 1 mile in length, running from Owl Creek, and carrying 200 and 300 inches of water respectively. Twenty acres of gravel remain. Ten men are employed.

McCoy & Co. mine, Yankee Jim's: Idle.

North Rino hydraulic mine, owned by Trafton & Hodges, at Yankee Jim's; area, 40 acres. Owners preparing to hydraulic.

Saint George, at Yankee Jim's: Idle.

Washington Consolidated, owned by Adams Brothers, is situated 1 mile northeast from Yankee Jim's, and was opened in 1864 as a hydraulic mine. There still remains a large body of gravel which may be hydraulicked. The total product has been $1,200,000. Ten men are employed.

Pond's mine, at Todd's Valley, owned by Pond & Constable, has been worked as a hydraulic mine since 1860. The mine contains 1,400 acres and owns two water ditches, one 14 miles in length and the other 10 miles in length, with capacities of 1,200 and 3,000 inches respectively. There still remains a limited amount of ground which may be hydraulicked. The annual production is about $40,000, and expenses $15,000. The mine may be drifted profitably for many years after they are forced to quit hydraulicking. Forty men are employed.

Big Spring mine, Henry Maye superintendent, near Forest Hill, and adjoining the Dardanelles, was opened in 1854 as a drift mine, and has been worked regularly since. At present it is being drifted through a joint tunnel with the Dardanelles. The face has been hydraulicked a little of late with water from the Miner's and Pond's ditches. There are 12 owners, who employ 8 men. Total production, $150,000.

Big Bonanza: Idle since 1880.

Dardanelles gravel at Forest Hill. This mine was opened in 1854 as a drift mine, and has yielded since then nearly $300,000 from the drifting and hydraulicking. It has been involved in an immense amount of litigation, or its yield might have been much larger. It is now owned by General Joe Hamilton, who leases it. Six men are employed drifting. The main drift tunnel is 1,400 feet long; besides this there are thousands of feet of branch tunnels. The face of the ground has been hydraulicked off. Consolidated into one property with the Dardanelles is the Oro. The area of the whole is 312 acres. Water is obtained through the Miner's ditch, owned by General Hamilton, from Shirt-tail Cañon. The ditch is 19 miles long, and carries 3,000 inches of water.

Excelsior deep gravel, Forest Hill; Berryman superintendent. The Excelsior Company sunk the first shaft back in the middle of the divide, which shows that the old river deposit extends over the whole. They have been working now three years with good results, although until very lately the work was all prospecting. A steam pump and hoisting works and mill to crush the gravel have been erected at considerable expense. From the appearance of the ground prospected, this mine has a good future before it. Twenty men are employed.

Mountain gravel mine, gravel drift, H. Maye superintendent: This mine is owned by a company of eight men, and was opened in 1863, and has been drifted regularly ever since through a tunnel 2,200 feet long. Total product, $300,000.

Mayflower gravel, F. Chappellet superintendent, has been hydraulicked a little for a number of years. The area is 370 acres. There are 4,500 feet of small pipe on the mine and 7,800 feet of flume. A large number of small prospect shafts and tunnels have been sunk and run. The work done heretofore has been on the gravel on top of a stratum of cement, but lately a prospect shaft has been started to prospect the gravel below.

Pemberton gravel adjoins the Dardanelles and Oro on the east. A little hydraulicking and drifting have been done in the way of prospecting for many years, off and on, without any great yield. The mine is owned by Mrs. Reawen; idle at present.

Missouri, J. K. Kingkade superintendent, is situated between Forest Hill and Yankee Jim's, and was opened in early days as a drift mine; reopened in 1880, and the bed-rock tunnel continued to 2,150 feet. Six men are at present continuing the tunnel.

Sacramento gravel drift, owned by Moreland & Co., situated 1 mile northeast of Yankee Jim's, was opened in 1852 as a drift mine, and worked irregularly since; 1,700 feet of tunnel have been run for prospecting.

San Francisco gravel drift, owned by John Weiland, is between the Big Spring and Pond's mine. The mine was hydraulicked a number of years ago successfully. A drift tunnel is now being run.

Sawler & Wilson drift mine adjoins Pond's on the east, and was opened in 1860 as a hydraulic and drift mine. There remains a body of gravel that may be profitably hydraulicked. The mine is now being hydraulicked and drifted on a small scale. Water is obtained from the Miner's and Pond's ditches. The total product has been $75,000.

Rough & Ready drift, John E. Allen superintendent, is situated under the town of Forest Hill, and is a consolidation of the Rough & Ready, Diesdesheimer & Robber. Six men are employed drifting through an 1,800-foot tunnel.

Paragon drift, owned by Bruce & Wheeler, is situated at Bath, and was opened in 1850 as a drift mine, and has been worked ever since as such. It was hydraulicked very profitably from 1860 to 1879, and may be hydraulicked for five years more. It has a water ditch 30 miles in length, with a capacity of 1,000 inches. There are two drift tunnels, each 4,000 feet in length, one on an upper and the other on a lower stratum of gravel. A 10-stamp steam cement mill crushes 50 tons of gravel per day. Total production $2,000,000. Forty men are employed.

Baker divide drift, William Muir superintendent, is situated in Volcano Cañon, 2 miles from Michigan Bluffs. A tunnel was run in 800 feet and considerable drifting done through it until it became too low, and now another tunnel is being run with good prospects. Twelve men are employed. Area, 1,300 acres.

Big Gun hydraulic, owned by Lee Van Emon, is situated near Michigan Bluffs, and has been worked regularly as a hydraulic mine since 1858. There remains gravel enough to hydraulic for twenty years. Total product, $1,000,000. Twelve men are employed.

Golden Fleece, H. Schermire superintendent, is upon the divide near the Forks House, and was opened as a drift mine in 1875; 2,000 feet of tunnel have been run for the purpose of prospecting. Five men are employed.

Hidden Treasure drift mine, A. M. Power superintendent, is situated at Sunny South, about 4 miles above Michigan Bluffs. The mine was opened in 1875, and has been drifted ever since. They are drifting the same channel that the Mountain Gate is on, 4 miles north. The channel is of white quartz gravel varying from 250 to 350 feet in width. The length of the present drift tunnel is 3,400 feet. The total yield from October, 1876, to November, 1882, has been $431,208 against expenses for wages, &c., of $213,910, and other things $56,241. The future prospects of the mine are excellent; 65 men are employed.

Hazard, J. H. Keown superintendent, is situated near the town of

Michigan Bluffs, and was originally opened in 1858 and reopened in 1873, when a shaft 130 feet deep was sunk on the channel in Volcano Cañon and a tunnel driven under the channel for a distance of 2,800 feet. The gravel is hoisted up the shaft by means of steam hoisting works. The total production through the main tunnel has been $26,000 and expenses $110,000. It is proposed to drive a tunnel lower down, beginning at Volcano Cañon, and thus do away with hoisting works. The company is now reopening what was known as the Exchange upper channel, on which drifting and hydraulicking was discontinued on account of endangering a water ditch. From this channel $250,000 was extracted.

Huffman mine was opened in 1877 at Deadwood by the Huffman Brothers, and has been worked regularly since. The owners are at present running a drift tunnel through which to work a well-developed body of pay gravel. Frank Huffman's mine at Sage Hill, near Michigan Bluffs, was opened in 1880, and has been hydraulicked since with water obtained from a ditch 2 miles in length, with a capacity of 400 inches.

Mitchell mine, gravel, situated at Michigan Bluffs, is lying idle at present.

Michigan Bluff mine was opened in 1855 as a drift mine and worked regularly as such ever since; 5,000 feet of tunnels were driven under an extremely rich crevice. The tunnels have recently been extended and an immense body of pay gravel developed. The gravel is drawn up a slope and out of the mine by a steam-engine, which draws 40 cars in a train. A 30-foot overshot water-wheel drains the mine. The ventilation is accomplished through an upraise from the interior works. There is on the face of the mine a body of gravel 600 feet wide and 200 feet deep which may be profitably hydraulicked for quite a distance into the hill. The main tunnel, the mouth of which is near the town of Michigan Bluffs, is being driven for the purpose of extracting the gravel of this mine. Its dimensions are 8 by 7 feet. The area of the mines is 2,160 acres. The total product of the mine has been $1,500,000, all of which was obtained from an area of 12 acres; 180 men are employed.

New Basil drift mine is situated on Black Cañon, and was opened in 1878, a shaft being sunk to the channel; 8 men are employed.

Rainbow mine, owned by E. Polifca, is situated 3 miles east of Sunny South, and was opened in 1855 as a drift mine, and has been worked irregularly since; 2,000 feet of tunnel have been driven. The total production $25,000, and expenses $30,000. A body of good pay gravel has recently been opened. Five men are employed.

Daniel Webster quartz mine, owned by an incorporated company, is situated about 2 miles from Michigan Bluffs. The mine was opened in 1853, but worked with an arrastra only, and reopened in 1881 by the present company, who are driving a tunnel and sinking a shaft in the lode. A five-stamp mill has been erected with a capacity of 10 tons of ore per day. The rock assays $40 per ton. The proportion of silver to gold is 1 to 100. Five men are employed. The future prospects are good.

Pennsylvania Flat mine, owned by the Ralston Brothers, is situated on the Long Cañon divide. The mine was opened as a hydraulic mine in 1874, and worked regularly since. Water is obtained from the Middle Fork of the American River through a ditch 24 miles long, with capacity of 1,500 inches. The total product of the mine has been $40,000, and expenses $80,000. The water-right is valuable and the gravel bed extensive. Ten men are employed.

The Weske Consolidated, William Muir superintendent, is situated 3 miles from Mountain Gate, and was opened in 1854 as a drift mine, and has been worked regularly since. A white quartz channel was first drifted for a distance of 6,000 feet. The width of this channel was 250 feet. The owners are at present working a lower channel which cuts off the white channel, and is about 500 feet wide. The main bed-rock tunnel is 900 feet long. A large and productive body of gravel is being worked at present; total, $1,000,000; expenses, $500,000; 50 men are employed. The mine is owned by 21 shareholders.

The Empire mine, owned by J. H. White, is at Canada Hill, and was opened in 1855 as a drift mine. It was reopened in 1878 as a hydraulic mine, and has been worked regularly since. A seven-mile ditch of 600 inches capacity supplies water from the North Fork of the Middle Fork of the American River; total product, $100,000. Seven men are employed. The future prospects of the mine both for drifting and hydraulicking are good.

Dias mine, owned by Joseph Dias, at Canada Hill, was opened in 1879 as a hydraulic mine, and subsequently drifted. It is being profitably drifted at present. Four men are employed.

Dam mine, owned by a company of 10 shareholders, is situated about 6 miles above Michigan Bluffs, and has been worked as a drift mine since 1858. The length of the main tunnel is 2,700 feet. The channel is about 100 feet wide. The average production per month is $1,000, and expenses $500. Eight men are employed.

Iowa Hill: Iowa Hill Canal is owned by the Iowa Hill Canal Company, and supplies water to the mines in the vicinity of Iowa Hill. The length of the main ditch is 25 miles. There are also 25 miles of branch ditches. The water is obtained from Blind, Eldorado, Shirt-tail, Indian, and Humbug Cañons. The capacity of the main ditch is 7,000 inches. The capacity of the branch ditches is 2,000 inches. The cost of constructing the ditches and reservoirs was $168,000. Hill's ditch supplies mines near Iowa Hill with water from Shirt-tail Cañon. The ditch is 12 miles long, and has a capacity of 800 inches.

Barber, Iowa Hill: Idle.

Booth mine, at Iowa Hill, owned by G. Booth, adjoins the Orion. This mine has been hydraulicked for a number of years. Work is at present suspended on account of the cutting of the water ditch. There is enough gravel yet to hydraulic profitably for a number of years.

Belt mine, at Wisconsin Hill, owned by Belt Brothers, adjoins the Lebauson and Hoorman's mine. The mine was opened as a drift and hydraulic mine in 1862, and worked regularly ever since. Three men are employed.

Cape Horn: Idle.

Columbia, owned by James Gleason, is situated at Wisconsin Hill, and has produced as a hydraulic mine $350,000. It is now worked by Chinese under a lease.

Hoorman, at Wisconsin Hill, owned by H. Hoorman, was opened in 1858, and has been worked ever since as a hydraulic mine; product $200,000. Five men are employed. The future prospects for hydraulicking and drifting are good.

Homeward Bound, at Iowa Hill, T. G. Durning superintendent, is owned by a corporation. The mine was opened in 1859 as a hydraulic mine, and worked regularly since. There remains a large body of gravel that may be profitably hydraulicked. A tunnel is being run to drift the back ground. Total product $100,000. Ten men are employed.

International, owned by Williams & Co., is situated at Monona Flat, and was opened as a drift mine in 1879, and is being worked profitably at present. Four men are employed.

Entwisle and Woosely, at Iowa Hill: Idle.

Garden Gate hydraulic mine, owned by G. A. D. Bonley, is situated between the Homeward Bound and Trio, near Monona Flat. The mine has been hydraulicked regularly since 1856 with water obtained from the Iowa Hill Canal. There remains a large body of gravel which may be profitably hydraulicked. Preparations are being made to drift a well-defined channel. Total product, $250,000. Fifteen men are employed.

Indian Cañon mine.—The company owning this property have 128 acres patented, but their works extend 2¾ miles down the cañon. In early days the cañon was mined very superficially, and a great deal of money taken out by many different parties. The total yield cannot be even approximated. The company propose to thoroughly clean the cañon out. A bed-rock cut a mile in length has been run up from the lower end, and in it is a flume 1,200 feet long, divided into two compartments, one 6 and the other 4 feet wide, and 7 feet deep. The company have now been at work five years.

Independence Hill hydraulic mine.—Opened a number of years, and has been run very successfully by John B. Hobson.

Lebanon mine, at Prospect Hill, is owned by a corporation. Henry Steuber is the superintendent. The mine was opened in 1854 as a drift mine, and worked regularly since then. A 10-stamp steam mill is on the mine. The main tunnel is in 1,500 feet. Total production, $200,000.

Mohawk, owned by W. T. Gould, is above Morman Flat, and was opened in 1860 as a drift mine and worked regularly ever since; 700 feet of tunnel have been driven, and gravel is being taken out at present from the channel.

Pritchard mine is situated at Iowa Hill, and owned by the Iowa Hill Canal Company. It was opened in 1874 as a hydraulic mine. This property consists of 40 acres, only 4 of which have been washed off. Total production, $25,000. Eight men are employed.

Providence quartz mine is situated on Shirt-tail Cañon, adjoining the Sucker Flat mine. This mine was opened by the present owners, S. B. Drury and Prof. W. P. Blake, in 1878, and a tunnel 700 feet long run to the lode.

Strawberry, owned by the Watts Brothers, adjoins the Sucker Flat mine; it was opened in 1854 as a drift mine. Over 7,000 feet of tunnel has been run. A channel has been developed recently and good pay gravel is being extracted; $103,000 have been produced. Two men are employed.

Sucker Flat is situated south of Iowa Hill and has been opened a number of years. It is now owned by Weske, who is working it energetically and profitably.

Trio mine, owned by Bonly & Co., adjoins the Golden Gate at Iowa Hill, and was opened in 1855 as a drift mine and in 1875 as a hydraulic mine and worked regularly since. A large body of gravel remains, which may be profitably hydraulicked. Total product, $115,000. Eight men are employed.

Union hydraulic mine, at Iowa Hill, is owned by C. F. Macy & Co.; has produced since 1880 $12,000 by hydraulicking. It is proposed to lease it to Chinamen.

Andrew Werley's mine, formerly known as the San Francisco, adjoins the Lebanon at Prospect Hill, and was opened in 1854 as a drift mine. It has been worked irregularly since. Good pay gravel is being extracted at present. Three men are employed.

Golden Streak, R. F. Rooney superintendent, is situated at Monona Flat, and adjoins the Sucker Flat mine. It was opened in 1881, and a shaft is being sunk for the purpose of drifting the Sucker Flat channel. The mine is owned by 8 shareholders.

Glencoe, William Polly superintendent, is situated on Roach Hill, near Monona Flat, and was opened in 1860. It has been worked irregularly since. The main tunnel is 1,600 feet long. Most of the work done so far has been in the way of prospecting. The total production has been $10,000 and the expenses $37,000. Good pay gravel has recently been developed. Six men are employed.

Colfax.—Rising Sun quartz mine, at Colfax, is owned by a corporation, and was opened in 1867. It was regularly worked until a temporary suspension in November, 1882. A 10-stamp mill is on the mine. About $1,000,000 has been extracted. There are nine levels on the mine, with aggregate length of 5,800 feet.

Cedar Creek, owned by John P. Hickey, embraces a number of original locations, the total area of which is about 200 acres. Recent operations have been confined to that part which may be worked through the Yankee tunnel, which discharges into Dutch Flat Cañon, near Bear River, and cost over $100,000. The upper stratum has nearly all been hydraulicked off. The lower stratum of blue gravel is now being worked and yields very well.

Gold Run.—Owned by the same man are a number of mines in the Gold Run district, including the Union and others, which contain an area of 200 acres. They are not being worked at present. The water rights of the property are very valuable, and include rights to water in Cedar Creek and tributaries, with 42 miles of ditches and a number of reservoirs. This property is all valuable, and will furnish work for many years.

Cañon Creek mine, known as the "Moody mine," is owned by E. L. McClure, and consists of a cañon right in Cañon Creek, 1½ miles in length, above and adjoining Keddee's Cañon claim. Through that part of the cañon the tailings of the hydraulic mines above are run through flumes and undercurrents. Total production, $300,000.

Hoskins & Albions, Gold Run, owned by Hoskins Brothers, has been idle for some years.

Indiana Hill Mill and Mining Company, P. H. Schnabel superintendent, is situated at Indiana Hill, 2 miles from Gold Run, and was opened in 1866 as a drift mine, and worked regularly ever since. Twelve hundred feet of tunnel has been run in bed-rock. An 8-stamp water-power mill is used to crush the cement; 70,000 cubic yards of gravel have been extracted at a cost of $2 per yard, and the total product has been $250,000. Thirty men are employed.

Gold Run Ditch and Mining Company, J. S. Gould superintendent, own a water ditch from the Yuba and Bear Rivers, 30 miles in length, with a capacity of 2,150 inches of water, besides the following consolidation of mines: Indiana Hill, Illinois, Gold Run, Church and Golden Gate, Taylor, Ben Tom, Harknes, Big Bonanza, Big and Little Pine, Top, and North Star, all situated in the Gold Run mining district. The mines were hydraulicked for twenty-five years, until the service of "*débris*" injunctions in August, 1881. There remains a large body of gravel which may be hydraulicked. The present company worked the mines profitably for ten years. The total cost, including purchase price, reservoirs, tunnels, &c., was $500,000. Sixty men were employed previous to service of injunctions.

Gosling Ravine, owned by J. H. Weisgerber & Co., is situated in the

Gold Run district, and has been hydraulicked regularly since 1856. Work has recently been suspended on account of the *débris* agitation. Eight men were employed. Total product, $400,000, of which $100,000 has been expended for water.

Kinder Cañon mine, owned by W. H. Kinder, includes 1¼ miles of Cañon Creek below the Moody Cañon claim. A series of flumes and undercurrents have been constructed in the claim, and through them the tailings of the adjacent hydraulic mines are run.

Dutch Flat.—Boston mine, owned by W. B. Nichols, at Dutch Flat, was worked for a long time as a hydraulic mine, but has been idle for two years on account of the "*débris*" controversy.

Hollis mine, Dutch Flat, has been idle eighteen months.

Franklin hydraulic mine, James Taaffe superintendent, owned by 4 shareholders, is situated at Dutch Flat; has been worked regularly and profitably since 1854 as a hydraulic mine, until the agitation of the "*débris*" question. There remains enough gravel to hydraulic profitably for many years. The cost of pipes, giants, &c., on this mine was $25,000. Thirty men were regularly employed.

North Star, owned by J. H. Lakampe, is situated on Graig's Hill, Dutch Flat, and was worked regularly as a hydraulic mine for ten years, until stopped by "*débris*" suit in 1881. The future prospects of the mine are good. Ten men were employed.

North Star No. 1, owned by John Rablin, is situated at Dutch Flat, and was worked by hydraulic process from 1859 to 1865. The owners are now sinking a slope to the channel for the purpose of drifting the mine. Five men are employed.

New Gold Run, J. A. Stone superintendent, is owned by a corporation, and is situated in Gold Run district. It has been worked regularly since 1865 as a hydraulic mine, and in 1881 shut down by the "*débris*" injunction. There remains a large body of gravel that can be profitably hydraulicked. The product of this mine has been large. Twenty men were employed.

Somerset hydraulic mine, owned by Nichols Brothers, is situated at Dutch Flat, and has produced a large amount of bullion. It is idle at present on account of the "*débris*" fight.

Shady Glen, owned by A. Larson, is situated at Alta, and was opened in 1872 as a drift mine. A number of prospect shafts have been sunk, and a tunnel 1,200 feet long driven. Gravel is being taken out by the channel. The mine would be hydraulic, too, were it not for the "*débris*" fight. Ten men are employed.

Lost Camp, owned by G. Bartlett, is situated in Blue Cañon, and has been hydraulicked for a number of years. There remains a good body of gravel for that purpose. The gold production by Chinamen in Placer County is about $180,000 for the last year.

PLUMAS COUNTY.

This county lies in the northern part of the State between the counties of Butte, Lassen, and Sierra. Its altitude is great, and its territory generally rugged and mountainous. It reaches across the summit of the Sierras almost to the State line of Nevada. There are several good hydraulic mines in this county and many large and probably rich deposits of gravel scattered over the county, but owing to their great altitude it is impossible to get water upon them with sufficient pressure to work them.

At the Metcalf and Haycock claims, on Gopher Hill, the Plumas

Water Company has its pipes in full blast, sending down the slickens in a lively manner. The main bank is about 160 feet high, with from 15 to 20 feet of gravel on the bed-rock. Against this two monitors, one throwing an 8-inch stream, are directed, and the dirt and gravel fairly melt away from them. A large body of pipe-clay is found above the gravel, and it has to be blasted, employing 7 or 8 men. About 30 men are on the pay-roll of the company. The mine averages about $400 per day.

Frank Vere & Co., the owners of Crescent Hill, on Batchelder Creek, have again commenced operations on their tunnel, and will push it through as rapidly as possible. They have only about 150 feet to run before striking the gravel. They have a very extensive claim, and are on the blue lode.

The Spring Hill Company, 3 miles south of Meadow Valley, is developing a large body of gravel, and the work begins to show what is contained in the channel, and the indications all go to prove it good. A tunnel has been run into the hill, and the bank of gravel appears to be equal to any yet opened up in the county. The ravines which have been worked from this immense lode have been notable for their richness, and why the channel has escaped the eye of mining men who have the means to open it is a mystery. When the ridge is thoroughly opened, there will be employment here for 1,000 men, and a season of prosperity will follow.

Green Mountain.—This is a ridge about 4 miles long, from Indian Cañon on the east to North Cañon, at Greenville, on the west; and about 2 miles wide, from Indian Valley on the north to Dixie Cañon and Round Valley on the south. The reservoir at Round Valley is about 1,500 feet higher than Greenville, and the summit above it rises about 1,000 feet higher. The ridge has been prospected on all sides, and only prospected, for all the mining yet done on it hardly goes beyond that, and wherever tapped is found seamed with gold-bearing quartz ledges. In the ravines running down the sides of the mountain are placers that are worked every season while the streams last, and pay well. When the ground is opening for prospecting hardly a week passes but some hitherto unknown ledge is found. A great number of these are now claimed and located by different parties. From all of them ore is shown bearing free gold in good quantity. The mines now being worked in the mountain are the Dixie Cañon, Green Mountain, Taylor Plumas, Indian Valley, Union, New York, Kettle, Cherokee, and Southern Eureka. In addition to these working mines, are a number of tunnels at different points run on ledges by as many separate claim owners. All or most of the ledges run toward the center of the mountain. The work now done on the mountain, being without any unity of action, is largely frittered away without accomplishing the results that would ensue from concentrated effort. If all this labor were guided by one mind and centered in a good tunnel that would cut at right angles the several veins that are known to exist, a great gold-yielding enterprise would be the result.

The Crescent mine.—A new strike has recently been made in this mine, between the old Crescent and Pet ledges, and runs east and west. Work has developed the vein to a depth of 50 feet. The ledge has increased from 4 inches on the surface to about 20 inches at the deepest workings, and carries large quantities of gold. So far the yield by mill process has been from $30 to $50 per ton. Thirty men are employed at present.

The Monitor.—This mine, situated at Long Valley, has been developed more rapidly of late than any other in this vicinity. Under a former management a tunnel was started and run 1,000 feet without touching the ledge. Soon after the tunnel struck the ledge and continued 500 feet in ledge matter. While the first 1,000 feet was being run, it was thought that by a slight change of direction the ledge could have been found, but no attention was paid to this. Since coming under the present management, the truth of the opinion has been verified. Work was begun in the tunnel and raises made in the direction where the ledge was supposed to be. These raises were started at several points, and in every case were run a distance of from 15 to 20 feet, when the ledge was struck and cut through, its least thickness being 10 feet; the usual thickness being from 14 to 16 feet. Here there is a ledge from 10 to 20 feet wide, nearly 800 feet deep, and 1,500 feet long, and no signs of its diminishing as it is opened further. With the amount of ore in sight, there can be no doubt that the Monitor will soon be one of the most valuable mines in the district.

The Providence, at Long Valley, is one of the most promising mines recently discovered in this district. A piece of float was picked up by a miner last April, which upon being broken showed free gold and very rich. From following up the ravine, the ledge was located. A tunnel has been run, and a good mine opened out.

The Genesee mine, at Genesee Valley, is a remarkable one. Four distinct ledges are opened, and from each of them a large amount of ore has been worked; the smallest of these ledges is 3 feet wide, the largest, 14 feet, and the drifts have been so worked that an immense body of ore is in sight. In two of the veins are found soft seams, which can be easily picked out. This is very rich.

The Eureka Plumas mine.—This old and well-known mine is still producing bullion as usual. Below the Mohawk tunnel, a good body of ore is being opened. The Eureka tunnel, on a level with the Mohawk mill, is now in a distance of 2,200 feet. When completed, it will tap the pay ore at a much greater depth than has ever been reached in the mine.

The Plumas National mine, on Soda Creek, will soon be reorganized under a new and active management. A large extension has been added to the property, and a line of work determined upon that gives excellent promise for renewed production from this mine. The plant of the company is in excellent order; the mill, chlorination works, &c., are all in complete order. A large amount of ore is said to be now in the stopes of the mine in condition to be easily worked.

The Green Mountain mine, near Greenville, in Indian Valley, is in successful operation. The company have 2 mills of 60 and 32 stamps respectively, which have been recently overhauled and put in perfect running order. They now have 3,000 tons of milling ore in the chutes and on the dumps ready to be crushed. Tunnel No. 5 is now in about 8,000 feet, and has recently cut the third or main great ore chimney of the mine, and opened it up over 250 feet, with the face still in excellent ore. The upper raise of 400 feet through ore and sulphurets has made connection with tunnel No. 4. The mine is in a better-developed condition than at any former time in its history, the amount of ore added to its reserves being very large. The company have placed in their mills new rubbing machines, three in the upper mill and six in the lower; also an arrastra has been put to work in the mill to work over the tailings from blanket washing and barrels where the pulp from the batteries is washed over after each general clean-up. This mine promises well for the future.

At the Edman mine, at Eagle Gulch, a pay chimney was recently struck which yielded several thousand dollars by the arrastra process.

Since then a tunnel was driven in some 70 feet and struck the ledge, which proved to be so rich that in two weeks over $20,000 was taken from the ledge and pounded out in a hand mortar. As high as $300 to $400 to the pan has been taken out, and from all appearance a large yield of gold will result from the workings.

The Robertson mine, in Genesee Valley, has been opened to a depth of 60 feet, and has a ledge about 2 feet in width. Some of the ore from this vein gave an assay value of $5.50 per ton of gold and $67.50 of silver. The owners are now constructing a road to the mine, which, when completed, will allow them to erect all the necessary machinery to successfully work this promising mine.

There are many quartz mines in this county which were worked many years ago and abandoned, but are now being opened and worked systematically. The Arcadian may be mentioned as an instance of this kind. A few months ago Messrs. McIntyre had about 1,500 tons of ore taken from their mine and worked at the Cherokee mill, which proved so satisfactory that they are now erecting a new mill, and will soon begin to mine and mill with promising results.

The Taylor Plumas mine, at Green Mountain district, is rapidly developing. When the ore was first struck it was supposed to be a pocket. The upraise is now 40 feet above the tunnel level, and the width fully maintained as well as the quality of the ore. The hanging wall is of gray granite, from which the ledge matter parts, leaving a surface as smooth as if it was polished, while the foot wall is soft brown rock, from which the ore parts as easily as from the other. The ore is of good milling quality, solid, brittle, and free from clay.

The Altima mine has a tunnel in a distance of 100 feet and most of the way in ore. The vein, which was 18 inches in width at the commencement, has widened to a width of 3 feet. The whole ledge is said to work $20 per ton in gold. This mine is to be worked in a thorough, systematic manner, with mill and machinery soon to be erected thereon.

Butte Bar.—The assays of rock from this mine are of high grade, and it is proving to be a very rich mine.

At the Monte Christo, the gravel improves as the tunnel progresses, and a full force of men is kept constantly at work.

The Emmons mine, located near the Green Mountain, is showing some very fine rock and paying well, with the mill in full operation.

The Altoona, at Dixie Cañon, is looking well. The ledge is from 3 to 4 feet in width and still increasing as depth is attained. There are 100 tons of ore now on the dump, which is soon to be crushed.

The Savercool mine, near Greenville, has been recently bought by New York capitalists, represented by William Savercool. The company intend to put the mine and machinery in first-class order, and under the present management the mine has a bright future before it.

Gold Stripe.—This famous mine is still producing well. The ledge is now opened 150 feet in the first drift; on this length the vein has an average width of four feet with 125 feet of backs. From the face of the drift the ore is run out and dumped down a shaft to the main tunnel; from this tunnel a cross-cut is now started that will again strike the ledge 160 feet below the upper workings, giving a total of 285 feet of backs. This cross-cut will be about 125 feet long, if the dip of the ledge remains the same as in the upper levels. The daily clean-ups are improving with each day's run, and a few more days will put everything in good condition. The daily work of the mill is 40 tons of ore, crushed with 24 stamps, and the total number of men employed at the works is 22. This shows that the ore is easy to mine and mill.

Southern Eureka.—In this mine there is a marked improvement in the ledge where it is being drifted on to the north. This direction carries workings deeper into the mountain, and as depth is gained the ledge becomes more solid, the walls better defined, and the stopes easier to keep. On the surface the ledge is easily traced from the present workings to the summit of the mountain, and down the north side; a tunnel could be easily run from this side that would tap the ledge at any required depth from 500 to 1,000 feet, or more, if desired. From such a tunnel chutes would carry the ore into a mill placed below the Round Valley Water Company's ditch, and this would furnish water and power for any amount of stamps that might be wanted.

Cherokee mine.—At this mine work has been commenced to sink the shaft 50 feet deeper than it now is; this will make the total depth 250 feet. There is every reason to believe that this will develop an additional body of ore that will be very valuable; this belief is based upon the known character of the ore in the ground already opened. The mine will be in excellent condition.

The Kettle mine has been thoroughly drained, the timbering of the main levels and stopes strengthened, and the ore in the face of the old levels will be sent to the mill as soon as the latter can be started up. The amount of work accomplished by the present company is very large.

Plumas Consolidated.—This is a hydraulic and drift mine, now comprising several claims, situated on the ridge called the Gibsonville and La Porte Ridge. About 4 miles of this channel have been worked which have yielded probably not less than $20,000,000; and it is estimated that at least 7 miles of this same channel still remain unworked. On Onion Valley Ridge, also, the same river bed or channel is known to exist. A Chicago company have been drilling to prospect the gravel in the channel, and found, after going through from 200 to 500 feet of lava, that the gravel in the channel is very rich.

The production of the Plumas Consolidated is about $5,000 per month. It may safely be said the Plumas Company has taken a new start in mining matters within the last two years. A great reduction in the expenses of mining and milling, together with several new and important discoveries, has seemed to put new life into the mining industry of the county.

SACRAMENTO COUNTY.

Sacramento City, located in this county, is the capital of the State. The mines are limited. The placer and river mines on the American River are nearly exhausted, the mining in that section being done almost exclusively by the Chinese. At Michigan Bar, 28 miles from Sacramento City, are quite extensive surface, and some hydraulic, claims which have been enjoined from working the last season. Near the town of Folsom is the Quartz Hill claim, owned by Masten & Gumerman, which has been in operation the last year, and has yielded a moderate income. The hydraulic of P. Donovan, near Michigan Bar, has been closed down by injunction. The Chinese in the vicinity of Folsom and Mormon Island have taken out in placer and river diggings the sum of $350,000 the last year.

SAN BERNARDINO COUNTY.

This county is situated in the southern part of the State and stretches almost across its entire width, its eastern boundary being the State of Nevada. It is by far the largest county in the State, embracing an area of 21,171 square miles. It has been, comparatively speaking, in an isolated position, until within the last two years the completion of the Southern Pacific Railroad across its southwestern corner has attracted attention of many people to its many advantages for permanent homes. The soil in the valleys or plains is very dry, and requires irrigation to make it profitably productive. The climate is particularly well adapted to the growth of oranges and all varieties of citrus fruits. Mining as an industry in this county is of very recent date, none having been done until within the last two years. Mining is principally confined to Ivanpah and Calico districts, although there are a number of others in which considerable work is being done.

The most important district in the county, and one which has been recently brought into public notice, is the *Calico district.* · Its location is 480 miles from San Francisco, about 60 miles northeast of Cajon Pass, 90 miles from San Bernardino, 42 miles from Rodgers on the Mohave River, and 6 miles from the nearest points on the same stream. The mines of this district are located in a barren, desert-like country; nothing but rocks, not a semblance of vegetation to be seen. Water, however, is convenient and good. There are about 300 mines or locations in this district, some of which are being successfully worked, and many others are being prospected. These locations cover an area of 8 or 10 miles in length by from 1 to 2 in width, nearly all of which show good prospects on top, but because of the general impecuniosity of the locators, there has not been much development done on what are termed the outside mines. In the Calico Mountain proper, however, there has been considerable work done, sufficient, in fact, to lead scientific and practical miners to believe that there is a great fissure vein running through the district, and that the innumerable stringers and streaks of ore being constantly found are feeders to and run into it.

The most prominent mine here is the King. It is developed to the depth of 250 feet, with some 500 feet of drifts and cross-cuts on the various levels. The latest developments show a ledge 20 feet wide, between well-defined walls, with rich streaks of from 2 to 3 feet wide on each wall, the intervening matter being principally red oxide of iron, carrying a small percentage of silver. Many car-loads of partially selected ore from this mine have been sold in San Francisco, averaging $300 per ton, and it is estimated that there are 10,000 tons of ore in sight in the mine that will yield $40 per ton, and perhaps much more.

The next in importance is the Oriental, under the management of Judge James Walsh, a veteran miner, who says that Calico is another Comstock, and so sure of it is he that his company has expended many thousands of dollars in developing their various locations, and are now erecting large and expensive mills for the reduction of ores already extracted.

In addition to the above may be mentioned the Burning Moscow, Red Jacket, Sue & Tay, and several others that have been sufficiently developed to be called mines. In all these mines the ore contains scarcely anything but silver in spar, and in the shape of chloride, bromide, verde plata (or green silver), and horn silver. Working results of several hundred tons show a result of from 80 to 90 per cent. of the assay value.

No gold has yet been discovered in this range of mountains, but in other spurs of mountains, some 15 or 20 miles distant, notably the Ord district, gold has been found in paying quantities.

A very important strike has been lately made in this district, which proves to be a deposit of silver ore in a kind of cement, said to resem ble plaster Paris. It is 60 feet in width, and yields $100 per ton with occasional bunches that will yield from 5 to 8 ounces to the pound. About 600 pounds of the latter, and about one ton of thousand-dollar ore were taken out in nine days. This streak of cement is about 4 miles long and from 50 to 1,000 feet wide, and every place where it has been tried has been found good. The parties who made the first location took from the surface 20 tons that milled $500.

The Sam Houston No. 3 mine has been energetically worked, and some rich strikes recently made. The pay streak in the shaft, which is down only 12 feet, is 3 feet wide, and on one side gives assays of $40 per ton, on the other $70, and in the center ore assaying $7,000 per ton has been taken out. The ledge is regular and well defined, and averages 10 feet in width.

The Four Aces mine is being developed by a shaft which is down 35 feet, showing a ledge 1 foot in width from top to bottom of the shaft. In sinking the shaft, a large quantity of ore was taken out and piled up in two classes, and the ore pile constantly increases as work progresses. This ore gives assay value of $100 per ton. Some of the ore has been milled which yielded $160 per ton, and some assays have run as high as 530 ounces to the ton.

The Cuba mine is another valuable location in East Calico, and is being developed with promising results. On looking over the Cuba location, almost the entire surface of the claim appears covered with a conglomerated mass of calcareous tufa and porphyry carrying chlorides and horn silver. Wherever the surface has been broken ore is visible to the eye. When the ore is first taken out it has a yellowish appearance, afterwards turning black under the rays of the sun or from the action of the atmosphere. All the first-class ore from this mine will work $300 per ton, and the owners make it a point not to sack any that will not assay that much.

Camp California, a short distance from Calico, which was almost deserted for a time on account of heat and sickness, is again alive with business. Many rich strikes are the result of a resumption of work here, notable among which are those of the Snow Bird, St. George, Belle Key, and others.

New ledges recently discovered near Camp Wood, some 45 miles west of Prescott, carry gold, silver, and copper in paying quantities.

Oro Blanco district is situated about 9 miles north of Whitewater station on the Southern Pacific Railroad. The mountain on which the mines are situated has an altitude of 400 feet, and contains large amounts of mineral-bearing rock. The ledges are located within an area of about 5,000 feet north and south between the two streams. The ledges run parallel with numerous spurs, and vary in width from a few inches to 6 feet. The formation is granite and porphyry, the quartz being a yellowish chloride carrying both gold and silver, and gives assays from $30 to $125 per ton. The principal mines are the Great Eastern, Great Western, Red Flag, White Deer, and McDowell. The Whitewater River, only 2½ miles distant, would furnish ample water-power for mill purposes, while plenty of water for mining purposes is furnished by Mission Creek. There are now 100 men in this camp, all being actively employed.

The Bonanza King Consolidated Mining Company is pushing its work vigorously. The main shaft is being worked with three shifts, pushing it down as rapidly as possible; connections are being made for air purposes, and several winzes and cross-cuts run, opening up the ore-bodies. The high grade character of the ore is almost incredible, the average for the past month being about $400 per ton for all the ore extracted. A. 10-stamp mill is in course of erection, and there is more than ore enough on the dumps and in sight to keep the mill running steadily for a year to come. The first clean-up of the new mill of the Bonanza King Mining Company has been deposited at the United States mint, amounting to 18,802 ounces, valued at $17,000.

Eagle Mountain district.—This district is situated about 60 miles from the town of San Bernardino, and about 80 miles west from the Colorado River. Wood and water are very scarce in this district, although some wood is to be found in the surrounding deserts. The ore thus far has gone from 200 to 580 ounces silver, and contains as high as 5 per cent. of copper. The mineral belt is about half a mile wide, and consists of one main ledge, and several small strata, the main ledge being over 5 miles in length, and from 50 to 60 feet in width, the capping being hematite iron, and in places black oxide of copper. It is claimed by competent judges that the Hematite mine alone has over a million tons above ground at a low estimate, and this is only one out of twenty on this same ledge. Four tons of ore are now being extracted from the Eagle mine, which is to be shipped for treatment. The ore is red and black copper and iron, and no doubt rich in silver. The country formation is granite and limestone, with a vast amount of quartzite.

Esperanza district.—This district is situated 6 miles northwest of Riverside, and indications point to a cluster of mines that must soon attract attention. No work has been done on the mines here, but some of the "croppings" or surface rock was recently worked in the San Francisco Mint which showed a return of $31 per ton. The ore is free milling and can be worked by either mill or arrastra. The whole side of the hills for miles is covered with the same character of rock, which yields gold and silver. If the rock in sight will average half as much as the mint assay, this will become one of the richest districts in the country, for there are millions of tons of rock in sight, to say nothing of what may be found in the lower depths.

Another and perhaps one of the most promising locations thus far discovered in Southern California, is that of the Providence Mountain, which lies off in the desert, some distance from Das Palmas. The property was lately sold to some San Francisco capitalists, they paying $200,000 for two-thirds of the mine. On the dump, as the result of the average of 1,100 different assays, there is ore to the value of $172,000 taken from this Providence Mountain mine.

Holcombe Valley and Resting Springs are again looking up, and there can be no doubt that improved transportation facilities will put a better face upon these districts.

Ivanpah district.—This district is situated 190 miles east from San Bernardino, and near the Nevada State line. It is the oldest mining camp in the county, and has produced bullion for several years past.

The Ivanpah Consolidated is the principal mining property of the district, as well as the principal bullion producer. The Alley Mining Company also have been doing well, having shipped about $24,000 in the first year.

Peavine district.—This district is about 10 miles west from Calico. The principal mine here is the Waterman, on which there is a Newton stamp mill constantly at work on ore yielding from $50 to $60 per ton in silver. Sufficient developments have been made to justify the owners in placing great value upon this property.

There are many other locations in this vicinity, all showing fine prospects, but not sufficiently developed to be called mines. In fact, a large portion of this county gives promise of a brilliant record in the near future. Many practical and scientific miners are of the opinion that a great mineral or metalliferous belt extends through this great desert, some 250 miles to the Colorado River. The entire region is now being vigorously prospected by the best miners in the world, many of whom have had years of experience in quartz mining on the great Comstock lode and elsewhere. The Atlantic and Pacific Railroad, which is now being built through the center of the county, and the heart of the mining region, will give an impetus to the development and working of these mines that may, and probably will, place this county among the leading bullion producers of the State. The bullion product of this county for the past six months may be stated at about $150,000. Judging, however, from the amount of work being done on the mines in the various districts and the number of mills in course of erection, this amount will be several times as much during the coming year.

SAN DIEGO COUNTY.

San Diego is the extreme southern county in the State of California, bordering on Lower California. The mining is done chiefly in the Julian, Pinacate, Cargo Muchacho, and Bamm districts.

The *Julian district* ten years ago attracted attention far and wide. These mines having passed into the hands of Eastern capitalists, and encountering a few discouragements, such as are incident to all mining ventures, have been allowed to languish; but recently new parties (old miners of experience) have taken hold of these mines and they are being developed. The prospects are very flattering for obtaining good, productive property.

The San Jacinto mill in the *Pinacate district*, after a partial run of ten days, cleaned up $1,200. The mill is now doing good work, and crushing from 12 to 14 tons per day. From the present outlook of the mine it is anticipated that the mill will be turning out a large amount of bullion soon.

The Yuma Mill and Mining Company at El Rio is in a prosperous condition; the mill is steadily at work and turning out a large amount of bullion.

The Ready Relief mine and mill at Julian is in prosperous condition at present; the yield of precious metals for the last six months has been largely in excess of any former period; the mine is looking promising.

Cargo Muchacho district.—This district was organized as early as 1862 as a mining district.

The principal mine in this district is Madre mine, which is a full claim of 1,500 feet, situated about 3½ miles from Ogilby Station, on the Southern Pacific Railroad. It lies in granite mountains, through which runs a reef or dike of talcose slate, the strike or direction of which is north 1° east, and is about 200 feet wide, having a casing of slate on the west as a wall and of granite on the east. It is in the talcose dike that the Cargo Muchacho ledges are found. The claim covers three ledges. The one upon which the first shaft was sunk is the extreme west ledge. No. 2 is 170 feet deep, and levels have been run from the 50, 100, and 170 foot stations. The width of this ledge varies from 1 to 5 feet. From the foot of shaft B a cross-cut was run east 31 feet into ledge No. 2. This ledge is parallel with the first, but is larger, and is the one upon which most of the work has been done. From where the cross-cut struck the ledge a drift was started north along, the vein showing a body of ore averaging 5 feet in width. The drift was run 225 feet. This opens an ore-body 200 feet long and 200 feet high, which is the only supply of any quantity opened. The shaft has been carried down about 100 feet further, showing ore and a ledge at the bottom of 8 feet in width, some stoping having been done on each side of the shaft.

The Madre and Padre mines are located parallel to each other, side by side; they are so similar to each other that a description of one will answer for both. They are also situated in a talcose dike, having an east wall of slate; the west wall is not well defined on the surface, but is supposed to be about one-half mile west of the Madre mine. They lie about one mile west of the Cargo Muchacho mine.

The Padre ledge runs north 12° west and can be traced the entire length of the claim. No systematic work has ever been done on either of these claims, and they show but little ore in sight. Not enough work has been done to show or determine the true strike and dip of the ledges. They have evidently been broken over on the surface and appear now to have a dip to the west, at an angle of 25°, being very flat. The ore appears to lie in deposits separate from each other, and lying one above the other in steps. Several shafts and inclines have been run, each showing ore which was extracted for milling, and milled by the Yuma Mill and Mining Company. This company secured contracts for the purchase of 14,000 tons of ore from these mines, and erected a 20-stamp mill on the Colorado River, at a point about 7 miles from the Cargo Muchacho mine. They extracted and worked the 14,000 tons of ore; the ore went under $10 per ton in free gold, sometimes going as high as $13.50 per ton. The gold is free and bright and easy to amalgamate, the sulphurets average (cleaned by buddle and containing 15 per cent. of sand) $260 per ton, and the ore contains about 17 per cent. of sulphurets.

All the mines mentioned have good roads leading from them to the railroad station, over which ten mules of average size can haul two tons per trip, and make two trips per day. The absolute cost of hauling the ore from the mines to the station is 42 cents per ton. The cost of mining and milling is very low. There is no water to contend with in the mines, timbering is slight and cheap, and wood is plenty at $3 per cord. This is for 4 feet mesquite wood, which is equal to the best oak.

With a mill erected at the Cargo Muchacho mine, ore that will pay $5 per ton can be worked at a fair profit, and there are several thousand tons stored in the mines now that will pay that much. The only reason for not putting the mill on the mines in the first place, instead of on the river, was, that water would have to be carried about 7 miles from the river to the mines. This, however, can easily be done at a cost not exceeding $17,000. With a mill on the Cargo Muchacho mine, ore can be mined and milled at a cost of not exceeding $3.25 per ton.

At *Pinacate* the mines are all doing well, the poorest quartz and quartzite run from $30 to $40 per ton in gold. Three mills are crushing the quartz, one of them being a custom mill, which is of the greatest advantage to prospectors who own rich claims without the capital necessary to erect a mill. The California Southern Railroad is now running two trains daily, each way, within half a mile of the mines and mills. From all reliable information that can be gathered Pinacate is destined to become one of the richest mining districts in Southern California.

SHASTA COUNTY.

Shasta County, lying in the northern part of the State, between the counties of Siskiyou, Trinity, Lassen, and Tehama, has received a good deal of attention from mining men during the past year, owing to several new and very important developments in quartz mining, the most important of which will be noted hereafter.

South Fork district.—This district is situated on the South Fork of Clear Creek, and most of the mines are comprised in an area of 4 miles in width by 5 miles in length. A portion of the mineral-bearing veins have a northeast trend, and the others trend to the southwest. The formation in which they are found is gneissoid, and the veins vary in width from a few inches to 25 feet. These veins are numerous, one claim usually embracing several of them. Silver and gold are the chief metals contained in these ledges, silver greatly predominating. The other constituents are argentiferous galena, iron sulphurets, copper pyrites, zinc blende, and various combinations of antimonial silver.

The ledges that carry gold in considerable quantities are decomposed by atmospheric agencies to a depth of 40 or 50 feet, and this gold, which is only worth from $8 to $12 per ounce, is easily and very profitably extracted by means of arrastras. It is generally found imbedded in streaks and pockets of red and yellow ocher.

The Chicago silver mine has been worked to a greater extent than any of the others; its main ledge is from 1 to 3 feet wide, on which several 100-foot shafts have been sunk, and 1,000 feet of tunnels run, the greatest depth so far obtained being 200 feet below the surface. The owners have a 5 stamp mill, roasting furnace, and the most approved appurtenances for thorough treatment of silver ores.

The ore as worked at the mine yields $75 per ton, and carefully selected car-load lots shipped and milled in San Francisco paid as high as $800 per ton. The expense of working this mine is light; lumber, fuel, and other supplies being handy and cheap.

Besides the mill on the Chicago there is in the district an 8 stamp mill, with a Frue concentrator, where custom work is done; also a 5-stamp battery and furnace.

Sunny Hill and Jerusalem districts.—As the North Fork of Cottonwood Creek emerges from the deep and rugged confines of the great granite divide between Shasta and Trinity Counties, at a point about one mile north of a great belt of conglomerate or cement gravel, is found a belt of talcose and copper slate, hornblende and porphyry. This belt is continuous from Sunny Hill, to and beyond Mount Bullychoop, a distance of over 14 miles, and carries with it quartz ledges, some carrying gold and others copper and silver; and still above these and lying between this belt and the granite is a large and regular belt of iron ore. The mines of this district are generally recent discoveries, and are not in an advanced state of development, and the owners have devoted most of their time and somewhat limited capital to the gold-bearing quartz. The only machinery in the district, as yet, are four large arrastras run by water-power. The gold extracted is unusually free from impurities, and the mint returns show it to be worth $19 per ounce. Below will be found accurate and condensed information relative to these mines.

The Alice mine has a 2-foot ledge, 20-foot shaft, 35-foot tunnel, and pays $15 per ton.

The Git-up-and-get mine has a 3-foot ledge, 60-foot tunnel, and yields $9 per ton.

The Lost Buck ledge is 1 foot in width, with a shaft 19 feet in depth, a tunnel 100 feet in length, and yields $20 per ton.

The Flower of Sunny Hill has a ledge 1 foot in width, a shaft 30 feet in depth, a tunnel 120 feet in length, and pays $20 per ton, the entire amount of gold so far taken out footing up about $4,000, and the expense of working being but a trifle.

The Dutton & Peck has a 2-foot ledge, with a shaft 120 feet in depth, a tunnel 100 feet in length, and yields $25 per ton.

The Dutton & Peck, No. 2, has a 10-foot ledge, and pays $9 per ton.

The Lone Oak ledge is 2 feet wide, and pays $21 per ton.

The Big Charley ledge is 4 feet wide, with a tunnel 150 feet in length and pays $18 per ton; total yield so far, $2,100.

This district is not yet half prospected, and greatly needs miners with some capital to start on. The facilities for working the mines cheaply are abundant; water-power, timber, &c., right at hand, and a good road leading to the center of the district.

Bullychoop district.—This district is one of the most extensive and richest mineral fields yet found in Northern California. It was discovered a few years ago by J. P. W. Davis & Brother. Its greatest drawback is its inaccessibility for wagons and teams, but it is likely that this disadvantage will soon be overcome, and a good road built. The district also stands in pressing need of extensive reduction works, and men of capital would here find a splendid opportunity for advantageous investment in that line, as well as in the purchase of interests in the mines. This district is situated for the greater part in precisely the same belt of talcose and copper slate as that of Sunny Hill, and is located on the western and northern slopes of Mount Bullychoop and extending over the boundary line into Trinity County. The ledges are all quite large, and range from 4 to 40 feet in width, and run in the same direction as those of Sunny Hill, and carry both gold and silver, the latter predominating. A 5-stamp mill and three arrastras constitute all the reduction machinery, and the process of development is consequently tardy.

Of all the mines here the Bullychoop has received the most attention, the proprietors having sunk 150 feet of shaft and run 100 feet of tunnel, and have taken out $50,000.

The Big Central mine has 100 feet of tunnel run, and ore to the value of $18,000 has been taken out.

The Pound Cake has only 100 feet of shaft and tunnel, out of which about $10,000 has been taken.

The other mines in the district on which considerable work is being done are the True Augur, Red Bluff, Occidental, Cumberland, and Mammoth. The latter is undoubtedly the master lode of the district, and it can be tapped from 3,500 to 4,000 feet by tunnels at three different points, cutting into a valuable ore body that crops out 40 feet in width and 1 mile in length. These mines are all situated at such great altitude that they can be worked by tunnels to great depths.

Round Mountain district.—In the central part of the county is situated the Round Mountain district, in which is located the Peck and Afterthought Consolidated mine. This mine is a vast ore-body, into which three parallel tunnels have been run from the mountain side, the longest one being 180 feet, and each of them has tapped the mineral deposit, but neither of them has penetrated through it, although one of them extends over seventy-five feet into the paying mass of quartz. The ores of this mine are principally silver and copper, but some gold and other minerals are obtained. Returns from shipments of ore to Swansea aggregate $450,000, averaging $36 per ton. The owners of the mine have recently erected and put in operation a 10-stamp mill, supplied with all the improved machinery necessary to work the ores by the Swansea process, and the results are highly satisfactory. The machinery is propelled by steam and water power, and as fuel is very cheap and an abundant supply of lumber and timber at hand, and the quartz easily extracted, the expense of running the mine is not great. A force of 8 or 10 men is employed, and the mill kept running day and night.

Adjoining the mine just mentioned, and under the same ownership, is the Seaman's mine. From the surface gravel and decomposed cement have been taken $75,000 in copper and gold.

Adjoining this is the Donkey, on which sufficient work has been done to demonstrate the fact that it contains a large body of silver and galena ore that can be successfully reduced by the same process employed on the Peck and Afterthought quartz.

Among the other promising mines in the district on which work is being prosecuted with favorable results are the Homestake and Ilers.

Copper City district.—This extensive district is located near Pit River and Squaw Creek. A large stream of very clear water courses fifteen miles through it, furnishing ample water-power, while the hills and mountains are covered with pine, fir, oak, and manzanita.

The principal mines are found on and near Killinyer Hills and Bully Hill Mountain, and are grouped within a radius of about 5 miles. The pay ore here is found, as a rule, in immense, irregular, and oftentimes broken masses or chimneys, apparently upheaved through the slate formation by some mighty volcanic force.

The Baxter claim has been pretty well prospected by means of two shafts, each 60 feet deep, and three tunnels of 500, 150, and 30 feet in length, which tap two large ledges far below the surface. The ledge matter in this mine is also well defined between regular casings or walls about 7 feet apart. Of the quartz from this claim 400 tons have been milled and an average of $30 per ton obtained.

The Extra and Winthrop are known to be rich in precious metals, and considerable of the ore has been worked, but base minerals interfere more or less in the processes so far tried.

The Bully Hill mine is situated on the summit and slopes of a high, round, peaked hill, or more properly mountain, crowned with splintered slate rock and burnt-looking bowlders. The surface formation for a depth of from 1 to 25 feet is a partially decomposed conglomerate, which yields very rich in gold and silver, going as high as $1,000 per ton. Below this rich conglomerate the rock grows hard, with fissures of tough clay, cement, and sand running down with the quartz rock, containing gold and silver. Numerous shafts and several tunnels have penetrated this hill a long distance, and the work still goes on at a lively rate.

The reduction machinery of the district consists of a fine 15-stamp mill supplied with all the fixtures for crushing and concentrating the ores and running the bullion into bars for shipment to San Francisco. During the four years the mill has been in operation the Bully Hill mines furnished the bulk of milling material, and in that time the company have produced $500,000. In addition to this quartz mill, the Extra Company also have a good saw-mill, and both steam and water power is employed to run these establishments.

Besides the mines spoken of, there are others that will most assuredly prove bullion producers when more fully developed.

The mines and mills of the district give employment to about 100 people.

Shasta district.—The following mines are located in the vicinity of Shasta, the county seat, where the pioneer placer miners found immense treasures, and fortunes were made almost in a day.

The White mines, 2½ miles east of the town, have been opened but slightly compared to their extent as indicated by the croppings. The ledges are about 2 feet wide, well defined, and contain gold, silver, and some of the baser metals. The mode of working the quartz has been by an arrastra, run by water-power, by which method the gold was about the only thing saved, and considerable of that was wasted with sulphurets. The gold yield was from $10 to $14 per ton on rock which assayed in silver and gold from $25 to $40. The surface gravel about these mines was sluiced off the bed-rock twenty-five years ago, and paid from $10 to $20 per day to the man, and the bare bed-rock is marked and striped in every direction, with small veins of quartz, many of which contain gold. On a hill above where the shafts are sunk a pocket of decomposed quartz was struck some time ago and $5,000 taken out in a few days.

Two and one-half miles south of this, on the southern base of Gage Hill, is the Bincard-Lowery pocket mine, from which $10,000 has been taken out in working a decomposed quartz seam 6 inches wide. In obtaining this amount of gold a shaft was sunk on the seam only 12 by 3 feet and 12 feet deep. This work was done by two men in two weeks, and they are preparing to erect an arrastra to expedite the work of reducing the quartz, having only used common hand mortars heretofore.

At the mouth of Middle Creek, 2 miles northeast of Shasta, is the noted Bunker Hill mine, for the possession of which armed men have fought, and thousands of dollars have been expended in litigation. This mine is a compound of sticky clay, decomposed quartz, and black sand, pierced through in all directions by bodies of burnt and disjointed slate rock, evidently interjected by volcanic action. In the formations between this slate, gold, coarse and fine, is encountered, and by running irregular drifts, crooked shafts, inclines, and open cuts, the estimated sum of $600,000 has been obtained from the mine. Owing to the death of one of the owners and disagreement as to the manner of conducting the mine, work has been suspended for some time, but there is a prospect of starting up soon.

At Flat Creek several quartz mines are being developed, with flattering prospects ahead. On the Murray claim a tunnel 400 feet in length has tapped a 3-foot ledge over 100 feet below the surface, and the quartz, worked in an arrastra, pays from $75 to $90 per ton, and is easy to get out.

At Little Backbone Creek a lode containing native and ruby silver has lately been located, and assays made from the ore-body go as high as $2,000 per ton. The sum of $5,000 was offered for an interest in the claim by a party who had never been on the ground and had only seen the croppings, but the offer was declined.

Seven miles south of Shasta, on Clear Creek, is the Potosi mine, discovered eighteen years ago, and a small and much-worn mill and concentration pans were removed to it and operations commenced. An incline shaft was run on the ledge to the depth of 98 feet, when water came in in such quantities as to require a powerful pump, and for want of it the mine was flooded and work stopped. The mine has since been purchased by Senator John P. Jones, who has allowed it to lie idle on account of his time and attention being fully occupied elsewhere, but his agent asserts that new machinery will soon be erected and work resumed. The ledge from the croppings to the bottom of the shaft averages 5 feet between the walls, and some gold is contained in all the quartz, but there is a narrow, continuous, and exceedingly rich vein of gold running down through the quartz, and in sinking the shaft this vein often shifted from the center to the sides of the ledge. During the two years the mine was worked thousands of dollars were taken out, and even with the indifferent machinery and inexperienced millmen employed, the ore crushed yielded $102 per ton.

Since the stoppage of work on the Potosi several rich veins or feeders connecting with the main ledge have been discovered and claimed. One of these, the Cleveland, newly found, has been traced 200 feet, is 6 inches wide, and the quartz is heavily seamed and threaded with gold. A 10-foot shaft, sunk on the vein a few feet, laid bare 700 pounds of this quartz, which, pounded out in hand mortars, showed that the return was at the rate of $1,600 per ton.

Iron Mountain district.—Seven miles north of Shasta looms up Iron Mountain, so named on account of bowlders of magnetic iron found on and about it. Several years ago a company located mineral claims on the mountain, thinking it valuable principally for iron ore. Running for several miles along the top of this elevation was a jagged ledge of burnt-looking brown rocks, which cropped out boldly above the ground and measured from 100 to 300 feet wide. Assays from these croppings were made about two years ago, and, to the astonishment of the owners, from $500 to $1,000 per ton in gold and silver were obtained. Great excitement followed, and a string of extensions and claims were taken up for miles. The Lost Confidence Company, proprietors of the original location, which embraces a mile in length of this monster ledge, set to work with energy, and have run two tunnels from the mountain side into the ledge. The most elevated tunnel is 140 feet in length, the other, 75 feet lower, is 300 feet in length, and a 75-foot shaft connects the two. Neither of these tunnels has cut through the ore body, although penetrating into it such a distance as to establish its immensity. The 75-foot shaft connecting the tunnels descends all the way through a compact mass of silver rock, which breaks and crumbles when exposed to the atmosphere or when handled. The company have lately completed a good turnpike from town to the mine, at a cost of $10,000, and have shipped and had milled 1,200 tons of ore, which yielded $1,900; and millmen who handled the ore admit that they failed to save a heavy percentage of the silver, owing to the process by which they were compelled to work it. The sum of $300,000 has been offered for the mine as it stands, and Hearst and other capitalists, who have inspected it and tested the ore, have entered into negotiations for its purchase.

The other mines on the mountain on which work has been commenced are the Potter and Emma Consolidated, which show promise of being as rich as the original mine. The rest of the locators appear to content themselves with working assessments and watching developments on the claims of their neighbors.

The Baughart mines, 4 miles from Whiskeytown, consist of a combination of claims, aggregating a large amount of ground, divided off to the satisfaction of the individual owners. The ledge or belt is located on a mountain at an altitude of 3,800 feet, courses north 60° east, and dips northeast at an angle of 40°. It shows a length of over 10,000 yards on the surface and has an average width of 180 feet. The ledge formation is what is called birdseye porphyry, and lies between well-defined walls of black slate. The principal work on the mine has been done on the portion belonging to Baughart, the original discoverer. In all, sixteen small tunnels have been run in along the sides of the vein, aggregating 6,000 feet in length, and the different shafts and upraises aggregate a running distance of 3,000 feet, the deepest shaft being 250 feet. In working the mine the gold is principally found next to the slate walls, and the largest deposits at the intersections of multitudinous small veins of quartz, black manganese, and oxidized iron, which run almost at right angles across the main vein. The gold extends back from the slate walls into the porphyry, but gradually grows finer in grain as it leaves the slate. The amount taken from this mine foots up about $80,000, and most all of the work has been performed by three men, and the only reduction works yet used are hand mortars and an arrastra run by mule power. The largest piece of gold yet taken out weighed 11 pounds, and quite a number weighing nearly as much have been found. The beautiful specimen that took the first premium at the great Paris Exposition was sent from this mine.

Near the Banghart mines are also located the Mad Ox mine and mill. This mine, now owned by George Hearst & Co., has a 10-stamp mill, concentrators, amalgamating fixtures, &c. Work is now being pushed on the 380-foot level. On this level are two tunnels 600 feet apart, and known as the north and south tunnels, each one cutting the ledge at right angles. The north tunnel is 140 feet long, and has an air-shaft of 113 feet to the surface. The south tunnel is 247 feet long, and is also ventilated by an air-shaft to the surface. From these two tunnels 450 feet of drifting had been done on the ledge, the average width of which is 3 feet. The mill, which has been operated in the winter and spring only, has in two years' running turned out $86,000. The average pay of the ore is $20 per ton, and the cost of taking out and milling is about $2.50 per ton. There is ore enough in sight to keep the mill going a long time, and plenty more that can be uncovered when wanted.

In *French Gulch district*, in the northwest part of the county, are situated a number of gold-quartz mines that have been worked with profit for years, and which appear inexhaustible. The district is supplied with a number of arrastras and two mills, and as the ore is all free from base metal, the work of gold extraction goes on without interruption. Among the most prominent of these mines are the Niagara, Brown Bear, Washington, Highland, and Shafter. William T. Coleman has recently purchased important interests here, and will soon erect a fine mill on one of his mines.

Gravel mines.—There are a few gravel or placer mines in the county noted for extent and richness of deposit. Of those, and on which are placed costly improvements and mining fixtures, are the Hard Scrabble, Tom White, Ragan, Dunham, Blair, Winn, Dixon, Homer, Williams, Reese, Church Hill, Salt Pork Ridge, and Slate Creek.

Scattered over the county are, according to the records of the assessors' books and other sources of information, about 250 small placer claims, which are generally worked by the owners on a small scale, and for only a part of the year. The amount of gold taken from these mines aggregates a large sum, but the individual pay varies from $1 to $4 per day.

There are in the county about 300 Chinese miners, who either purchase claims from white men or work over abandoned mines, being content to work any claim where the pay does not fall below $1 per day, and even 50-cent gravel receives their attention.

About all the placer mines in the county are worked by water obtained from reservoirs, ditches, and canals constructed over twenty years ago, and at heavy expense. The Clear Creek ditch extends from the

Tower House to Horsetown, and, with its branches, is 40 miles long. It carries water enough to supply 100 claims, and its construction cost $100,000. It is the property of John P. Jones.

SIERRA COUNTY.

This county is one of the leading mining counties in the State. It lies between Plumas County on the north and Nevada County on the south, the western boundary being Yuba County. The western and mining half is divided into a series of parallel east and west ridges or divides by the several branches of the Yuba River having their source in this county.

The rivers run through tremendous cañons, rendering communication very difficult. Supplies have to be brought entirely from the valleys by freight teams from 50 to 70 miles. The high altitude also makes the winter very severe. The richness of the mines, however, balances their inaccessibility and the disadvantages under which they are operated.

The principal quartz-mining industry is located in the vicinity of Sierra City. Downieville, Alleghany, and Pike City are also located in the vicinity of and to a greater or less extent dependent on quartz mines.

Drift mining, which in aggregate of annual yield is probably the most important mining industry of the county, is carried on at Forest City, Alleghany, Gibsonville, Howland Flat, and Saint Louis.

Brandy City, Scales, Port Wine, Gold Lake, and Logansville are the localities in which hydraulic mining is the leading industry. On the extensive northern divide between the South Fork of Feather River, on the north, and Slate Creek, on the south, are Whisky Diggins, Hepsidam, and Gibsonville.

Whisky Diggins.—The Redding drift has paid well, and is being systematically opened, so that a large force of men can be worked.

The Iron Bound drift mine is paying some, and prospecting work is being done which it is expected will find the rich lead of the channel.

Hepsidam.—The Hepsidam or Niagara Consolidated, formerly the North America, has been extensively and profitably worked for many years. The owners are now running a tunnel, which it is expected will be 6,000 feet long, to open up the back channel; the front channel, which is opened by several tunnels, being the one worked at the present time.

Gibsonville.—The Gravel Hill mine is now being worked by hydraulicking. The bed-rock gravel has been drifted out, and the top gravel left is that now being worked. A very profitable clean-up has been made from a ninety-day run this year, and a large area of ground yet remains available for working.

At the Union Consolidated drift mine, adjoining the Gravel Hill, a rich back channel has been discovered since the front channel was worked out. Its future prospects are excellent.

The Squires drift mine is paying well.

Between Gibsonville and Laporte, 8 miles to the west, the ridge, until this year, has been unprospected. It is believed to contain a rich channel, but the expense connected with running the necessary tunnel has deterred prospecting.

During the summer two bore holes were sunk on the Go-Ahead Company's ground. One of those reached bed-rock at a depth of 351 feet, the other at 410 feet. Eastern capital is interested, and further prospecting will be done during the coming year.

On, or rather in, Slate Creek is the Alturas tailing claim. The company own 5 miles of the creek bed, which contains much of the original gravel and a deposit of tailings from 200 to 800 feet in width and from 20 to 60 in depth. A cut is being made 2,000 feet in length, which will give the necessary grade to work the deposit. It is undoubtedly very rich.

On the divide between Slate Creek on the north and Cañon Creek on the south are Fairplay, Scales, Union Hill, Poverty Hill, Port Wine, Grass Flat, Saint Louis, Pine Grove, and Howland Flat.

Fairplay.—The Fairplay hydraulic mine is one of the oldest in the county, having been worked continuously by the hydraulic method since 1854. The water season lasts from three to four months. One thousand inches are used, and thrown from two giants under a head of 250 feet. The gravel washed is comparatively soft. About 30 feet of the bottom has been left until lately, when, on account of the other banks becoming high, it is being worked. Six to eight men are employed, and the annual yield runs from $30,000 to $40,000. A large area of ground yet remains to be worked, and a steady yield of gold is anticipated for many years to come.

Scales.—The Cleveland Hydraulic Mining Company have 800 acres of land in their claim, of which only about 35 have been mined. The water season varies from 90 to 120 days. From 2,000 to 2,500 inches of water is used, being brought by their own ditches from the tributaries of Rock and Slate Creeks. The banks piped vary in depth from 20 to 100 feet, the upper layer being a soft white quartz gravel, containing fine scale gold, and the lower a tough cemented gray gravel, much richer in gold, but correspondingly more difficult to wash. The main bed-rock tunnel is being increased in length to 800 feet to open up more ground. The yield of gold for 1882 was $18,000.

The Union Hill hydraulic mine has a much shorter water season than the Cleveland, the supply being 1,200 inches for from 60 to 80 days. The gravel is hard and cemented, and requires bank blasting. It is very rich, the yield for 1882 being $22,000.

Poverty Hill.—At this place is the Gold Valley hydraulic mine, one of the most important in the county. It has been worked, and paid well for the past twenty-five years, and there yet remain 250 acres of ground to be washed, all of which is very rich. The water season varies from 70 to 90 days, the supply, 1,500 to 2,000 inches, being brought by a ditch 3½ miles long from the tributaries of Cañon Creek. The depth of gravel worked is from 80 to 100 feet. It is very rich and contains no pipe-clay. A new bed-rock tunnel, 2,800 feet long, has been opened during the past year to get grade to wash the back ground. Twenty men are employed. A tunnel is being run to strike the channel in the Lucky Hill drift mine. It is now in 2,000 feet, and the claim, which comprises 800 acres, is considered to be very valuable, as the channel in adjoining claims on both sides is very rich.

Port Wine.—The Canada hydraulic mine, with 1,000 inches of water for a very short season, made satisfactory returns. About 100 acres of ground yet remain to be worked, but the banks becoming high, the mine will probably be operated by drifting. It is a very easy mine to work, requiring but 5 or 6 men. Its prospects are excellent for many years to come, and if sufficient water could be had would without doubt be one of the leading gold producers in the State.

Grass Flat.—The Grass Flat or Pioneer hydraulic mine, comprising 362 acres of workable gravel, has just been fairly opened. It will be for many years one of the leading hydraulic mines in the county. The mine is supplied with water from the tributaries of Slate Creek by several ditches, one of them being 12 miles long. Three thousand inches of water are used, and the season lasts 120 days. The yield for 1882, under necessarily unfavorable circumstances, is reported to be $70,000.

The Union mine, adjoining Grass Flat, is working 10 men prospecting. The claim is considered a good one.

Saint Louis.—The Suffolk Company have found the channel in their drift mine again, and very rich.

The Donahue hydraulic mine yielded well this year.

Several drift claims are being prospected, but had at the date of reporting struck nothing.

Howland Flat.—The Bonanza drift mine, a recent consolidation of several old locations, and adjoining the celebrated Empire drift mine, is the leading claim at this point. It is opened by a tunnel 3,000 feet in length. The channel, recently rediscovered after having been lost for several months, is very wide, the pay streak being from 300 to 500 feet in width, and the channel nearly 1,000 feet. The mine, whenever working on the pay streak, has been extremely rich. The prospecting done on the late strike indicates a continuation of the large yield of the mine. When working, the full force of men employed is 100.

The Virginia drift mine, adjoining, has not been yielding much gold during 1882, the work done being mainly in prospecting for the Bonanza channel.

The California Consolidated drift mine is being worked. It is opened by a tunnel now in 2,000 feet, and being driven for a back channel, which is expected to prove very rich. The front channel, which is being worked with a fair degree of success, is about 200 feet wide.

Below the California, on the same ridge, the Roscoe is being prospected. A tunnel is in 500 feet, but no gravel has been struck yet.

The Last Chance hydraulic mine is reported to have yielded a large amount of gold, and paid well during 1882. The banks contain considerable lava and pipe-clay. The aggregate annual gold product of this section of the county is very large. The bank at Laporte is reported to ship about $1,000,000 in gold annually, at least $700,000 of which comes from the Sierra County mines noted.

Brandy City is about 7 miles south of Scales and 6 miles northeast of Camptonville, from which point it receives its supplies. At this place are two important hydraulic mines. The Brandy City mine is the most important claim, and has been operated for twenty years. A water supply of 2,000 inches, under 200 feet of pressure, is brought by 12 miles of ditch from the head of Cañon Creek. The mine is worked continuously, the water supply being constant. The banks being washed are quite high, from 60 to 100 feet, and very hard, requiring considerable bank blasting. Forty men are employed, and the mine will probably increase its annual yield, as much of the remaining material is the rich gravel on the bed-rock, which is as yet untouched.

Arnott & Co. have about twelve years' work before their mine is worked out. It is similar gravel to that in the Brandy City mine, and equally rich in gold. Their water season is only 120 days. At Grizzly Hill, near Brandy City, Sharp & Co. are working a small hydraulic mine, the gravel being similar to that in Brandy City.

Indian Hill.—At this place are two small hydraulics, the Bliss & Co. and the Pendola, worked about 120 days annually. The banks contain considerable quantities of pipe-clay and bowlders. A small force of men is employed.

Pike City.—The Alaska quartz mine is the only important enterprise. The mine was reopened and a new 20-stamp steam mill put on this year. The claim comprises 4,000 feet on an east and west ledge, in slate walls, and about 4 feet thick. The main vertical shaft, which is 19 feet by 7, in three compartments, is down 350 feet, and drifts have been run on the 60-foot, 100-foot, and 220-foot levels; 2,100 feet in all. Three chimneys of pay ore have been discovered and worked. All of them are widening as depth is attained, and will probably finally run together and form a continuous ore-body. The ore is principally free milling, but carries a small per cent. of high-grade sulphurets. The yield per ton averages about $25, and during the month of November the production was about $900 per day. With that production it ranks in the county a close second to the celebrated Sierra Buttes quartz mines.

Mountain House.—The Brush Creek quartz mine, which has not been worked for three years, will be reopened in the spring and a new shaft sunk; the old one, which is 850 feet deep, being unavailable for use. New machinery will also be put on. The mine has yielded a large amount of gold, and the last rock taken out of the bottom of the shaft yielded $18 per ton.

The Winans hydraulic mine, 3 miles southwest of this place, runs about 120 days each year and pays well. The gravel breaks up readily when piped. The expense of fitting up the mine preparatory to work was $3,000. Some quartz prospecting is being done in this vicinity, but no developments of any note have been made.

Forest City.—At this place is the most important drift mine in the State, the Bald Mountain, and so complete is it in all its appointments and methods of work that it warrants an extended description as the typical drift mine of the State. The claim comprises about 320 acres of ground, through which runs a winding channel for 1¾ miles. The width of the pay streak varies from 300 to 800 feet, averaging 500, and the grade is about 150 feet to the mile. This channel has been followed on the bed-rock by a tunnel through its entire length in the mine, its dimensions being 3½ feet, 9 feet, and 6½ feet in the clear. It is heavily timbered with 12 and 16 inch round timber and lagged. An air-shaft 269 feet deep has been sunk 2,000 feet from the entrance to the tunnel, and by an ingenious use of mine waters on the principle of a Bunsen pump, perfect ventilation is secured. In the tunnel and numerous working galleries a 20-inch gauge steel-rail track is laid, and a small, specially constructed, and powerful locomotive is used to take the cars in and out of the mine. From the main tunnel drifts are run 80 feet apart into the gravel; it is desired to breast out cross gangways, also 80 feet apart, connecting these, but leaving 40 feet of unbroken ground adjacent to the main tunnel to protect it while working the mine. About 18 inches of the bed-rock and 36 inches of gravel are breasted out. The average daily output to the hand, including all employed in any capacity, is five car-loads of 27 cubic feet, or 4,000 pounds each. Outside of the mine the arrangements for washing and storing the gravel are very complete. There are three dumps for storage, or for lots of gravel from different parts of the mine, having a total capacity of 25,000 car-loads, and a small dump for prospecting; also separate tracks and sluices for each of them. There are also separate buildings for the office, for the storage of mining supplies, candles, powder, &c., and a building for the locomotive. The flow of water from the mine varies, but it is at present about 25 inches, not sufficient to wash the gravel taken out, for which purpose a full head can only be had in the winter. The company has 1½ miles of sluices in Oregon Creek, through which the gravel must pass before being finally discharged as tailings. The full force of men employed in the wet season is 200, and in the dry 75. The cost of fitting up the exterior works to the mine was $125,000. The claim was opened by the present company in 1872, and has paid regularly ever since, the aggregate yield to date being about $2,000,000, of which $900,000 has been paid out as dividends. The gold taken out is coarse, ranging in size from a wheat grain to nuggets weighing 70 and 80 ounces. About 8,000 feet of the channel has been worked out, and the gross yield per linear foot has been $500, and the gross yield to the square foot $1. From the indications of explorations made, it is believed that there is another channel in the mine east of the one at present being worked. Should such a channel be found, the mine will pay largely for many years. The development and management of this mine reflect great credit on the owners and the superintendent, Hon. H. W. Wallis.

Northeast of Bald Mountain is Ruby drift mine, comprising an area of 600 acres. A tunnel has been run in 2,000 feet and struck good pay gravel. From the general appearances of the gravel and gold taken out, it is supposed that they have the same channel as in the Bald Mountain mine. The expense of opening up this mine is said to have been $200,000.

East of the Ruby and Bald Mountain claims is the extensive claim of the Bald Mountain Extension Placer Mining Company. It runs up and covers the divide for 3 miles, comprising about 1,400 acres. It is being worked through a tunnel running in at the southwest corner for 4,600 feet. Rich gravel has been found and considerable gold taken out. At present the tunnel is being run up the ridge in search of the channel, which is supposed to have taken that direction. The cost of fitting up this claim is said to have been $90,000.

The Wisconsin Drift Mining Company has been running a tunnel for three years past, but have discovered nothing yet.

The Home Stake quartz mine, north of the Ruby mine, is being thoroughly prospected, and a 5-stamp water-power mill being put up. The ledge looks very promising, and quite an ore-body has been opened.

There is considerable stir in drift mining in this vicinity, and a number of promising properties will be prospected soon. Drift mining in the vicinity of Alleghany is the source of the gold yield. The Gold Star, Buckeye, Alleghany, and Blue Tunnel are all working small forces of men, and are all yielding gold and reported to be paying well.

In this vicinity are a large number of quartz mines, on many of which considerable work has been done. None, however, are being operated at the present time. The general character of the ledges in this vicinity has a tendency toward the concentration of the gold in pockets, which have often proven extremely rich, but the great mass of the quartz is practically barren. The Bullion, Docile, Golden Gate, and Harlem mines have all been extensively worked, and are well equipped with mills and machinery. There is no present prospect that any of them will be operated in 1883. The more promising of the undeveloped quartz mines are the Hope, Bowles, and Ireland.

Chip's Flat.—The only important mine here is the Rainbow quartz mine, which has become celebrated from the extremely rich and large quantities of specimen rock taken out. The ledge was discovered by hydraulicking a gravel mine, and was worked for many years under very disadvantageous conditions. The mine was systematically opened about eighteen months since at an expense of $35,000. Since that time $200,000 have been taken out, and the prospects for a continuance of this large yield are very favorable. One small hydraulic mine, the McNulty, is reported to be paying fairly. Top gravel is being worked, the cream on the bed-rock having been drifted out.

American Hill.—The American Hill hydraulic mine, comprising about 350 acres, is worked every winter, and is one of the producing mines of the section. The water supply of 1,000 inches for 100 days is brought by a ditch 4 miles long from Jim Crow Cañon. Fifteen men are employed.

On the Hennen Pass Ridge there are several undeveloped drift mining claims awaiting the advent of capital to determine their value. This ridge has never been prospected, but there are many indications of the presence of a channel rich in gold.

Eureka North.—The only mine of importance here is the Mugginsville hydraulic, which is reported to be paying well, though there are a number of small claims producing more or less gold. The water season is short, from 90 to 120 days.

Downieville.—The Gold Bluff quartz mine continues a steady producer. It has been worked almost continuously since 1851. The tunnel through which the mine is worked is now in 2,000 feet. The ore, which is low grade, is worked in a 20-stamp mill, water-power.

The Good Hope quartz mine is not being worked, on account of litigation. Several quartz-ledges are being prospected, among which may be mentioned the Oro, Mexican, Junction, and Slug Cañon.

There is no gravel mining of any consequence immediately at Downieville, but a few miles from it are several promising mines.

The Excelsior hydraulic and drift mine is 5 miles north of Downieville, on the divide between the North Fork of the Yuba and Good Year's Creek. A large area of a front channel of red quartz gravel is hydraulicked, and a back channel of blue gravel is opened and worked by drifting through a tunnel 700 feet long. The water season is only 120 days, and the supply about 500 inches. For the work done thus far the mine is reported to have paid well, but to fully develop it will require a considerable outlay.

The Cray Croft hydraulic mine, 4 miles northeast of Downieville, is doing well, and prospecting in the immediate vicinity will undoubtedly develop several equally valuable mines.

The Blue Range hydraulic mine, adjoining, is also reported as paying well.

On Ladies' Cañon, 10 miles east of Downieville, is the Lewis hydraulic mine. It is a very extensive and rich claim, and its annual yield could be made very much larger.

The Atwood drift mine, near Poker Flat and 12 miles northeast of Downieville, is reported to be looking well. The tunnel is in 800 feet and in a channel of rich blue gravel.

Logansville is at the present time one of the most prosperous mining amps in the county. Three hydraulic mines, the Logansview, Avaanges, and Dutch, work all the year and pay largely—about $10 per day to the hand. They are what are known as bar claims, in distinction from the blue gravel hydraulic mines. The water supply is obtained from the Yuba River, and it is possible to obtain almost any desired quantity and pressure. All three of the claims have ground requiring several years to work.

The Marguerite Gold Mining and Milling Company's quartz mine is the leading producer of gold, and bids fair to be one of the leading quartz mines in the State. The ledge was discovered in hydraulicking in the Rising Sun gravel mine, a bar claim similar and adjacent to the bar claim just above noted. The ledge has an east and west course and dips to the south at an angle of 52°. The foot-wall is quartzite, and the hanging wall porphyry. The mine is worked through a shaft now down 275 feet, and levels have been run at depths of 100 feet, 175 feet, and commenced at 275 feet. Steam hoisting works are at present employed, but the water-power will be put in in the spring of 1883. A 20-stamp mill has been put up and run steadily. Thirty-five tons of rock have been crushed daily, and the monthly runs made thus far range from $11,000 to $14,000. There is a small per cent. of sulphurets that will assay $1,000. Forty men are employed. The same company have located a tunnel claim running back from the Marguerite location into the mountain, and will soon commence work on it. It is expected that it will open up a large number of blind ledges, and it may be extended to tap the Keystone and Martin quartz mines at depths of about 1,500 feet. It is an important enterprise and has every prospect of success.

Sierra City.—The Sierra Buttes quartz mine, the most extensive and largest producer in the county, is the leading mine in this place. The quartz at present being milled is taken from tunnel No. 7. No. 8 tunnel is being opened up preparatory to taking out ore. It struck the ledge when in 4,000 feet. No. 9 tunnel is being run from the lowest point on the mountain that could be obtained, and will open up the mine 500 feet deeper than the present workings. As soon as No. 9 tunnel is completed, the 50-stamp mill, now considerably higher than the present workings, will be moved down to the river and its capacity increased. About 180 men are employed. The following figures are taken from the annual report of the directors of the company for 1881 and 1882: The ore produced by the mine during the last half year (January 1 to June 30) was 19,437 tons, and the same quantity milled. The average mining cost was $4.10 and the milling 60 cents, making the average working expenses $4.70 per ton. The average yield of the ore in free gold was $6.47, and with that from the tailings $7.06. The high cost of mining was caused by an average of 75 cents per ton on the entire output being applied to the construction of No. 9 tunnel. The tailings from the mill are worked over in arrastras run by water-power. About 30 are in operation and give very satisfactory returns.

The Phœnix quartz mine, 2 miles north of Sierra City, is being opened by a new tunnel. The ledge varies in thickness from 2 to 7 feet, and the ore mills from $14 to $20 to the ton. The mine is considered very valuable, and will be opened up and producing bullion in a short time.

Several other quartz locations are being prospected with very encouraging results. A large capital is, however, necessary to accomplish much on any of them, as they are very expensive to open.

At Clipp's Hill, the Thousand and One drift mine is being prospected. Some pay has been found, but the tunnel is being run for a supposed back channel.

Four Hills.—Three miles from Jamison and 15 miles northeast of Downieville, is located the Four Hills quartz mine, a promising mine, opened during the last two years. An 8-stamp steam mill was put up this year, and the mine is reported to be paying well.

Gold Lake.—This district is 8 miles northeast of Sierra City. The mines, which are all worked by the hydraulic method, are shallow placers, from 4 to 8 feet deep, but very rich in gold from the grass roots down. Davis & Wilson have a large area of ground. They worked 90 days in 1882, employing 3 men, and the yield is reported to have been $20 to $25 a day to the man.

The Foss employed 5 men and paid $10 a day to the man.

The New York Company cleaned up $6,000 after a five weeks' run, working five men.

The Havens and Woodchuck claims yielded equally well.

The mining outlook for Sierra County is excellent, and the yield of gold will probably be much greater in 1883 than in 1882. Many of the old mines will increase their output, and new ones yielding largely will commence operations. Hydraulic mining is hampered by a very short water season, and quartz mining by the large capital required to thoroughly prospect and equip the ledges.

SISKIYOU COUNTY.

Siskiyou County lies in the extreme north, bordering on the Oregon line, between Del Norte on the west and Modoc on the east. The remoteness of these counties from San Francisco makes it almost impossible to give a detailed description of the mines and mineral resources without giving it an individual inspection and personal examination.

There are a great number of claims this season on Klamath River; some just prospecting, some paying expenses, and some yielding largely, among which are the Centennial mine, the McConnel, &c.

The Portuguese companies, at Hawkinsville, are busy, with a good supply of free water, and with promising remuneration for their outlay and labor.

The Kanaka Company directors held a meeting lately on the ground at Klamath River, in the vicinity of their claims, and decided to commence work at once on the bar below the ferry, where Kratiger struck it so rich some years ago and lost the lead by working into the bank instead of following up the river. They will rig up a derrick at this point, besides pump and other machinery. After the water recedes the company will put on a wing-dam from their foot-dam to the ferry, a distance of 300 feet, where another derrick, pump, wheels, &c., will be built.

The Centennial mine, situated on the Klamath River, have their wing-dam completed, and are making preparation to put up two large derricks, with all the other necessary apparatus, when they will be ready to take out gravel from their large pit, and will run the machinery day and night, with a large force of men. The night work will be performed by the aid of an electric light. A great quantity of timber is now being rafted down the river, and great preparations are being made to wing-dam at and below Oak Bar, on the Klamath River, as soon as the water is down to low summer period.

At the mouth of Scott's River, and below, the miners have not been able to get in the stream until late in the summer, owing to the great amount of snow still remaining at the sources of Scott River.

Allen's mine, at the head of Willow Creek, is being prospected by Mr. T. J. Sullivan, and is developing a ledge now 75 feet wide, and if it continues to widen in going down, although of low-grade ore, the great amount of the ore and so easy of access, with other great advantages which it possesses, will develop a paying mine.

The Grizzly quartz mine is owned by Messrs. Bailey, Brown & Boldz, at Fort Jones, who have struck good milling ore and are erecting a 5-stamp mill, with Frue concentrators, and pans for working sulphurets.

The Sell mine, the McSill & Co., the Stuart and Short mines, at Fort Jones, are yielding pay ore and are being well developed.

The Wright & Fletcher mine and the Allen Brothers, at Oro Fino, are producing bullion and paying a small profit to the owners.

The Martin & Co. placer claim at Humbug Bar is paying a small profit.

Mitchell & Co., at Callahan's, are working and producing largely.

In the month of December last very rich rock was struck in the Portuguese mine, near Yreka, which has created an excitement in the town of Yreka.

The Oak Grove claim is now paying handsomely, a large amount of rich gravel having been taken out the past summer and fall.

Tucker & Johnson made a clean-up from a crushing of quartz taken out of the ledge on Deadwood, realizing excellent pay. They shut down their mill for the winter season, but will continue getting out quartz for a good supply to crush in the spring.

The rain-storms have started operations in some of the dry diggings, and if the rain continues a few days more there will be lively times. Ground sluicing can be carried on to good advantage if water is abundant.

The Yreka Creek Mining Company's ditches and reservoir are now well supplied with water, with prospects of furnishing sufficient water to keep the elevator going most of the time, in place of about sixty hours a week as heretofore.

The Chinese Hydraulic Company, at Spring Gulch, north of the town, are busy getting ready for operations, and will probably have a good supply of water in a day or two by the Greenhorn ditch, to commence piping.

There are at least 12 or 15 claims in the Honolulu district of Klamath River, and a number below towards Oak Bar and mouth of Scott River, also many on Scott River.

At Cottonwood, Humbug, the Siskiyou foot-hills, Parkhouse, Beaver, Hungry, Little Humbug, Empire, and other creeks, a good deal of placer mining is carried on, and the Empire quartz mine is on the latter, in which a low tunnel is almost completed to the ledge.

In this section there is a good deal of placer and hydraulic mining, and also quartz mining, on the divide leading to Deadwood, Indian, and McAdams Creeks, where several good ledges exist, including the rich Grizzly Gulch ledge, of Indian Creek.

All along the west side of Scott Valley, good hydraulic, placer, drift, and quartz claims exist, and on the headwaters of Scott River rich mines also occur.

In *Salmon* district, in the southwest section of the county, many good quartz ledges exist, also placer mines, and good mines exist at the head of Sacramento, near Mount Shasta. All other sections of the county are principally composed of farming, grazing, and timber land.

Many companies here are prospecting parties, working when able or having the means to develop, while we know of only one large company with sufficient capital, known as the Black Bear, which is now prospecting extensively, their old ledge having run out or down to poor paying rock.

STANISLAUS COUNTY.

Stanislaus County is one of the most productive agricultural counties in this State. It is situated entirely in the great San Joaquin Valley. There is but one mining camp where mining is being conducted. It lies in the foot-hills of the Sierras, in the eastern part of the county, at a town which was formerly called French Bar, now known by the name of La Grange, on the headwaters of the Tuolumne River.

At La Grange is situated the La Grange Ditch and Hydraulic Mining Company. This company first began active operations in mining in the spring of 1871, and have continued successfully ever since. The diggings are from 40 to 80 feet in depth. This mining company own a large body of rich pay gravel that cannot be operated on account of being about 20 feet below the river level.

These mines are the only hydraulic mines in Stanislaus County. The company own one of the finest water privileges in Southern California, in the ditch that brings water to the mines. This ditch taps the Tuolumne River by an underground flume three-fourths of a mile in length, 17 miles above the mines. Its capacity is 2,700 cubic inches of water; only about 1,700 cubic inches of this water is *now* used for mining purposes, the company only operating one set of hydraulic diggings. This ditch affords, at La Grange, one of the finest sites for milling purposes anywhere in the State. This mine has produced a large amount of bullion the last year, and is being successfully worked.

There is also situated on the Tuolumne River, near La Grange, the quartz mill and mine of the Olsen Company, which has been in successful operation the last year, producing, in paying quantities, both gold and silver bullion.

These comprise all the mines which are now in operation in Stanislaus County, producing in the aggregate $92,030.

TRINITY COUNTY.

Trinity County lies between the counties of Humboldt and Shasta, in the northern part of the State, and from its distance and inaccessibility from the line of supplies has not been as thoroughly prospected as it would have been if its supplies and mining machinery would not have to be transported so great a distance. The California and Oregon Railroad, now being constructed, will be of great benefit in the transportation of its supplies. The Trinity River, with its tributaries, drains this county, and runs northwest and empties into the Klamath River in Humboldt.

Trinity is wholly supported by its mining interests.

The Oregon Gulch Mountain mines, situated 5 or 6 miles southwest of Weaverville, are very extensive mines; they employ 20 men and work night and day; they clean up several thousand dollars per month. There is a water ditch which takes its water from Cañon Creek, at a point 9 miles above Junction City. The water has to be conducted by ditch and iron pipes to a point on the west side of the river just opposite the town. The water will be used in working the McKinney and Reno mines. It is conducted down the river from an elevation of about 500 feet, in 22-inch pipe, and will force itself up on the other side to nearly the same height; it cost $80,000. The ditch was constructed by Dr. Hayes, of Boston, Mass.

The Brunswick mine is situated at Deadwood. The present developments consist of a shaft sunk to a depth of 50 feet and a tunnel run a distance of 800 feet. The ledge has not been tapped by the tunnel. In the shaft the ledge is from 2 to 3 feet in width, and much of the rock shows free gold.

At Niagara and Washington mines are taken out good rock, and the indication for a good paying property is favorable.

Messrs. Baker & Hickey have a quartz mine on Eastman's Gulch, above Lewiston. They crushed 20 tons of rock in their arrastra, and realized 21 pounds of clean gold. This is at an average rate of $200 per ton.

Johnson's gravel mine.—This mine is situated at Indian Creek, and is one of the most regular bullion-producing gold mines in this county. Its prospects are good to continue to produce bullion for years to come.

The Nash Deep Gravel Mining Company is on Coffee Creek. Its prospects are excellent. The company will make a good showing this season. They have struck one of the richest gravel deposits ever found in the county. Work on the new ditch and other improvements is progressing favorably at Buckeye.

The Tolly and Bolt's Hill claims are being regularly worked. The Bolt Hill tunnel flume is completed. It has been thoroughly flooded, and packed with gravel and rocks, and is now running gravel successfully and rapidly. The bed-rock tunnel through which the flume is constructed is 7½ by 7 feet, and 1,525 feet long. Work was commenced five years ago, and finally completed in December, 1880, but it was not used until this spring.

The Trinity hydraulic gold mine has 30,000 square feet of bed-rock ready to bottom. The bottom gravel is 6 or 8 feet deep. The whole ground is of the same character as the rich dirt which they struck last year. This, however, has to be tested, as they have at no place gone to the bed-rock, only washing off down to pay ground. They have good reason to be hopeful, and it will be a matter of public interest to demonstrate that all the high bars along this part of the river are rich. All the other high bars on the river remain as yet intact.

The Lewiston Hydraulic Mining Company, on Park's Bar, have just placed in position an improved hydraulic elevator, which is doing good work and more than fulfilling the most sanguine expectations of the company. The elevator takes the earth and gravel, as fast as it can be fed by a 5-inch nozzle, and runs it through a 30-inch pipe. As an illustration of its power, bowlders which could scarcely be moved with crowbars are shot through like marbles.

Boles & Co. are running this winter on Sailor's Bar, and will set boxes in a month. They are using about 1,000 inches of water, or about half the capacity of their ditch.

On Big Flat the Portuguese company are running two claims, with good prospects in both claims.

One mile below them is another Portuguese company, on what is known as Jackass Flat. This is a large bar, and a very light one to work, there being but a few bowlders. Their dump is high, and the gravel pays from top to bottom, but they have only a small head of water, not lasting over four months in the year.

Carson & Donald made a clean-up after two days' run, intending to hunt the best place on their bar to work this winter. Satisfied with this result, they are now sluicing in that cut; and will no doubt do well.

McMurry & Hupp's hydraulic mine, at Weaverville, is in a flourishing condition and yielding largely.

Rule & Brother's hydraulic mine, in the vicinity of Weaverville, is in successful operation and paying well.

The quartz mines are all situated in the Deadwood district. There are several small mines prospecting. The Brown Bear mine, which is yielding well, is situated here; has a 10-stamp mill, with all the modern improvements, with four Frue concentrators. This mine is worked by tunnels. The ore mills $30 per ton, free gold, and 4 per cent. in sulphurets, which yield $120 per ton.

The Chinese, it is estimated, took out in this county last year not less than $200,000.

TULARE COUNTY.

Tulare County lies in the southern portion of the San Joaquin Valley, and extends from the Coast Range of mountains, on the east, to Inyo

County, on the west, and bounded on the north by Fresno and the south by Kern County. Agriculture is its main industry.

At the head of White River, which empties into Tulare Lake, is located the *Mineral King district*, which is 7,500 feet above the level of the sea. The situation of the mines at that great altitude is a serious drawback to their development. There are at present only two mines reporting production, the Williams & Popple mine and the Mahurin mine.

The gold produced from the Williams & Popple mine is out of vein quartz worked by the arrastra process. The company have been running tunnels the last six months, and have not been extracting ore from their mine.

The Mahurin mine has had to contend with a body of water, and not having the proper appliances to take it out has been obliged to suspend operations.

The Double Standard and various other mines in this district have been suspended for over a year in consequence of being involved in litigation.

The production reported to this office, in gold, $1,475; silver, $1,499.

TUOLUMNE COUNTY.

Tuolumne County in early days had extensive surface or placer diggings, which at the present time have become nearly exhausted. Very little work is being done at placer mining at present except by the Chinese. Quartz mining is receiving a good deal of attention and is the principal mining industry of the county. A number of new and very important discoveries have been made within the last two years, and the mining excitement of early days in "old Tuolumne" seems to have been revived. There are several good gravel claims scattered over the county which are yielding fairly.

Patterson quartz mine.—This mine was discovered in 1853, and extends 1,834 feet along the lode. The ore, which is free gold, is in slate formation. The management of the mine has recently been changed and great improvements are being made on both the mine and mill, and fine results are expected in consequence thereof.

There are several other claims, some of which are located on this lode, and in this vicinity, which are considered to have merit, but at present are not working.

Raw Hide mine.—This mine, situated in Raw Hide Gulch, is also in slate formation. The shaft has reached a depth of 300 feet and work stopped, although the last ore taken from the mine showed very rich rock. The ore is very rebellious, containing antimony and tellurium. A 20-stamp mill belongs to the mine, and if the property was properly managed could be made to pay well.

In this district are also located the Prospect, Tarantula, Isabel and Gem, Alameda, and Rappahannock, all of which are supposed to have considerable merit, but upon which no work is being done at present.

At Whiskey Hill, about 1 mile west of Jamestown, is the Alabama Consolidated mine. The ore lies in talcose slate formation, is of low grade and is in large deposits on the east side of the vein. A 40-stamp water-power mill belongs to the company, Work on this mine has been recently suspended.

The Little Gem is located to the east of, and parallel to, what is known as the mother vein or lode, and forms a part of the original "Orio" location. It is worked by means of a tunnel; has a 10-stamp mill, and has been very productive in free gold. Its future prospects are also very good.

The Mooney mine contains 535 feet along the lode. A new tunnel has been constructed during the past year, and the ore worked from it has given very satisfactory results. There are several other mines here and on Whiskey Hill which are said to have merit, but are not worked at present.

The Heslep quartz mine, situated on Quartz Mountain, is one of the oldest locations in the county. It has been worked almost continuously, although with variable results, for the past twenty years. The ore, which is in slate formation, carries free gold. The company have a 15-stamp water-power mill, and steam hoisting works at the mine. A rich chute of ore has lately been struck on the 400-foot level which promises well.

Adjoining the Heslep on the south is what is known as the Knox & Boyle mine, which in description, development, equipment, and production is almost a counterpart of the Heslep mine.

In this vicinity are located the Sweeny, Dutch, Gray Eagle, Miller & Holmes, Golden Rule, and others, all claiming more or less merit.

The Shawmut quartz mine, located on the mountain above the west bank of Wood's Creek, about 2 miles northwest of Jacksonville, has a shaft 400 feet in depth, showing a 2-foot vein of free gold. The company also have in course of construction a tunnel commencing at the base of the mountain, and is intended to strike the vein several hundred feet below the present workings. The entire length of the tunnel will be 1,050 feet, of which 860 feet have already been run. Former products of this mine justify the belief that this will prove a valuable and lasting one.

In the vicinity of Jacksonville several rich strikes in pocket mines are reported, and much attention is given to prospecting in this vicinity.

The Soulsby mine at the lower level is extracting rich ore, and the mine has not looked so well for years.

Divoll is still taking out large quantities of gold in his Bonanza claim at the upper end of the town. Recently the men in the drifts came upon a large body of gold to the south, showing that the gold in this immense vein is not confined to one locality. About 100 feet on the hill above the present incline shaft, some boys who were prospecting on the surface found some beautiful specimens. Mr. Colby investigated the find and soon began to do business that a "forty-niner" would be proud of.

In the vicinity of Sonora and on Bald Mountain, east of Sonora, are quite a number of quartz locations of the character, known as "pocket mines"; but few men are employed, and but little machinery for the reduction of the ore; it being in most cases pounded out in a hand mortar. Some of these mines have yielded very largely in free gold.

In the *American Camp district*, about 10 miles east of Columbia, are quite a number of valuable locations, some of which contain silver; but owing to the rebellious character of the ore many of them cannot be worked without expensive machinery, requiring more capital than can be commanded by the present owners.

The Riverside quartz mine is located on the right bank of the South Fork of the Stanislaus River, and has a shaft down to the depth of 500 feet, and a tunnel in 750 feet. The pay chute reaches a width of 300 feet. A 20-stamp water-power mill is kept running on the ore from the mine.

The Sonnet, adjoining the Riverside, has been prospected to some extent, and from all appearances bids fair to be one of the best mines in the district. It is quite probable that it will be consolidated with the Riverside.

Several new strikes have been made during the past season above the left bank of the South Fork of the Stanislaus River, about 5 miles east from Columbia. A 5 stamp mill has been erected and is crushing rock with good results.

The Arnold mine has yielded well during the past year, and its future prospects are flattering. The Birney, Rifle and Smooth Bore, and Staten are located in this vicinity.

The Keltz mine is located on the left bank of the South Fork of the Stanislaus River, about 12 miles northeast from Sonora. Systematic work was begun on this mine in 1878, and in the following year the mill, hoisting works, and pump were erected. The ledge, which is from 2 to 7 feet in thickness, is in slate formation. The shaft is 300 feet deep and about 100 feet of levels run on the ledge. The cost of mining and milling is from $10 to $15 per ton. The ore is delivered to the mill from the shaft on steel-wire ropes stretched across the gulch, which is 800 feet wide; a very economical arrangement.

The Evans and Hazel Dell are both located on the mountain above the Keltz.

In *Confidence Mining district* the Green mine is the only one at work. During the past year systematic operations were commenced. New hoisting works and a 10-stamp steam mill have been built at a cost of $20,000. The yield of gold up to the present time has been large; the last rock crushed by the mill yielded $100 per ton. The pay chute is very wide and in granite formation. This mine bids fair to become one of the most valuable ever discovered in the county.

The Soulsby mine, 8 miles east of Sonora, was discovered in 1856, and has been in almost continuous operation since. There are three shafts on the mine, which are 400, 490, and 630 feet in depth, respectively. More than 2,000 feet in length have been explored. The walls are well defined and the mine is perhaps the best instance known of a true fissure vein in granite formation. The average yield from the rock for a term of five years was $27 per ton, in free gold. The cost of milling, mining, &c., is about $10 per ton. The product of the mine to date can be recorded at millions of dollars, while rich ore can be seen in the deepest workings of the mine.

The Platt mine, adjoining the above, has been prospected to a considerable extent. A shaft has been sunk 160 feet, and 350 feet of drifts run therefrom. The ore so far extracted yielded from $9 to $70 per ton. Judging from the result of the work done on this mine and the character of the rock, it is safe to say that the Platt will be a very valuable mine when further developed.

The Churchill mine at Soulsbyville lies west of the Soulsby mine and parallel with it. From the shaft, 500 feet from the south boundary, ore that paid in the mill $40 per ton has been extracted. The vein has many of the characteristics of the Soulsby vein. The indications point to an extensive and fairly profitable ore-body which will be developed by future work. The mine has a 5-stamp mill, with pans, settlers, and roasting furnace for the treatment of sulphurets.

The Whitton mine lies 6 miles east of Sonora and is in the same mineral belt as the Soulsby, and has the same geological features. The shaft has been sunk to the depth of 300 feet and 1,100 feet of drifts have been run through the ore-bodies. The ore has yielded in the mill from

$16 to $60 per ton. The vein, which is in granite formation, looks strong and rich at the bottom of the mine.

The Louisiana mine, at Cherokee, and about one mile from Soulsby's mine, is the only mine at present working here.

The Grizzly gold quartz mine is on the left bank of the North Fork of the Tuolumne River, 11 miles east of Sonora. The formation is slate and the walls are regular and well defined. The main shaft is down 360 feet, and 860 feet of drifts have been run; the ore thus far worked has yielded from $5 to $60 per ton. The company own a 20-stamp water-power mill which is run very economically, while the cost of mining and milling the ore does not exceed $5 per ton. There are large reserves of ore standing in the mine which assure years of profitable work.

The Starr King gold quartz mine lies above the North Fork of the Tuolumne River, 1 mile southeast of the Grizzly. The shaft is down 270 feet on the vein, and 330 feet of drifts have been run; the ledge, which is from 1 to 3 feet in width, is in slate formation; the yield is from $15 to $30 per ton, and is free gold. Very rich specimens have been obtained suitable for jewelers' purposes, some of which sell as high as $3.85 per ounce of quartz. There is a 5-stamp mill attached to the mine.

The Sherman, is a southern extension of the Starr King, and although but little work has been done, the showing would indicate that they are both on the same vein.

The Spring Gulch mine lies about one-half mile southeast of Sherman, and is supposed to have considerable merit.

The Buchanan quartz mine is located on the main ridge between Big Cañon Creek and the main Tuolumne River. The main shaft reaches a depth of 300 feet. The company are at present running a tunnel to strike the ledge at a much greater depth than the present workings; the ledge, which is free gold, is in slate formation. Late workings in this mine have opened up a rich chute of ore, and the prospects of the mine are very flattering.

The Chaparral mine lies near the Buchanan. A large amount of work has been done on the mine in sinking the shaft and running drifts, and quite a large amount of ore has been opened out ready for extraction, the value of which has not been determined.

In the *Big Oak Flat* and *Garotte* districts but few mines are being worked at present. Mount Jefferson, the most extensively developed mine, is in litigation, and consequently is idle.

The surface placer mines in this county are fast approaching exhaustion. The most liberal estimates from this class of mining during the past year, which has been done principally by Chinese, do not exceed $65,000; of this amount $25,000 is credited to Columbia district, $5,000 to Sonora district, $10,000 to Jamestown district, $20,000 to Jacksonville district, and $5,000 to Big Oak Flat district.

On Table Mountain there are quite a number of locations, only two of which are being worked at present.

The Rough and Ready Gravel Mining Company has lately commenced work upon its gravel mine near Beaver Flat and about 2 miles west of Montezuma. It is at present engaged in hydraulicking a large deposit of gravel lying along the west base of the mountain, it being an outcrop beyond the basaltic cut of Table Mountain. The results thus far are very encouraging. The claim comprises an area of 480 acres, and the water to work it is obtained from the Tuolumne County Water Company.

The Montezuma Tunnel Company adjoins the Rough and Ready mine, and they have run a long tunnel in which they are reported to have struck rich gravel lying on a stratum of pipe-clay above the top of the tunnel, thus giving great encouragement for the future of the mine.

The Tuolumne County Water Company own the entire system of water ditches north of the Tuolumne River. The water supply is obtained principally from the North Fork of the Stanislaus River, and furnishes all that portion of the county lying north and east of Chinese Camp which falls below the line of the ditch. The company have three large reservoirs at different points on the South Fork, with sufficient catchment to supply the ditch during the greater part of the year; the main ditch, together with its lateral branches, must equal if not exceed sixty miles in length.

A very important strike has been made on Bald Mountain, near Sonora, whereby three men have taken out over $200,000 within the past year from what are known as pocket mines. This mine is known as the Devol mine, and is situated only a few feet from the main street of the town of Sonora. The veins are narrow and the gold of erratic occurrence in nests and benches. The company is still prosecuting its search, but in a more systematic manner, by deep sinking.

YUBA COUNTY.

This county, lying between the main Feather River on the west and the Middle Fork of the Yuba River on the southeast, and almost surrounded by the rich mining counties of Butte, Sierra Nevada, and Placer, has been the source of an immense gold yield. The eastern and northeastern parts of the county, drained by the Yuba and its several forks, constitute the mining sections of the county. The character of the mining is almost exclusively hydraulic at the present time. No drift mining and but little quartz mining is done. The shallow placers are very nearly exhausted and the river bars practically worked out.

Brownsville.—Between this place and Forbestown, in Butte County, 5 miles to the north, seems to be the center of the most active and successful mining industry in the county during the year 1882. New York Flat and Ohio Flat, shallow placers worked by hydraulicking, return a large yield of gold.

The Nevada Company have about 15 acres of ground, averaging from 15 to 20 feet in depth, yet to wash. The pay in this as in all the adjoining claims lies in about 18 inches of gravel close to the bed-rock. The ground pays from $10,000 to $15,000 to the acre. Twenty men have been employed and 600 inches of water used during a six months' run this year. The yield reported for 1882 is $22,000 as against $53,000 for 1881.

The Portuguese company opened their ground and made a very successful short run this year. They have 20 acres of ground.

The Motor claim covers about 60 acres, which, so far as worked, yields $4,000 to the acre. A two months' run, using 75 inches of water and employing two men, yielded $1,300—a net profit of between $800 and $900 being obtained.

Steele & Co.'s claim adjoins the Nevada, but as grade for the sluices cannot be had until that claim is worked up to the line, no work is being done at present. This claim has yielded largely, and there yet remains considerable ground to work.

The Kendall & Roberts and the Conover mines have not been worked during 1882; both are rich claims. Water for these mines is obtained from the South Feather River ditch, most of the claims being able to obtain pressure of about 200 feet.

The Mount Hope or Beehive quartz mine is being prospected and stopes opened. The vein, or rather lode (as several blind ledges have been encountered in sinking the shaft), runs nearly north and south, having granite for the foot wall and slate for the hanging wall. The mine is opened by a vertical shaft down 100 feet, and about 900 feet of drift has been run on the 50-foot level and 200 feet on the 100-foot level. The quartz carries a small per cent. of sulphurets, but is practically free milling. The mine is equipped with steam hoisting works and an 8-stamp steam mill. Though considerable gold has been taken out at times, the ledge is not fairly prospected yet, the depth to which it is opened being insufficient to determine the permanence with depth of the ore-bodies discovered in the surface work done.

Oregon Hill.—The mines in this vicinity are all shallow placers, giving small returns to individual miners during the rainy season. The aggregate of the gold yield in this vicinity for the year 1882 does not exceed $3,500.

Bullard's Bar.—Two miles southwest of Bullard's Bar, Hill & Co. are opening and prospecting what is known as the Summit quartz mine, with very encouraging prospects. A shaft has been sunk 90 feet and a tunnel run in 250 feet on the ledge. The ledge has an average thickness of 3 feet and carries a heavy percentage of iron pyrites. Until the ledge is more thoroughly opened and explored, it is the intention of the owners to work the ore with arrastras, two having been put up for that purpose. The indications are excellent for a first-class property. A little river and bar mining is done on this and Foster's Bar, one-half mile farther up the river, but the yield is very small.

Indiana Ranch.—At this place are the only quartz mines that can report any gold product for 1882. The ledges are in granite, have a parallel north and south course, and pitch more or less to the east.

The Adams & Carter is worked through a tunnel on the vein and in 650 feet, giving at the deepest point about 160 feet of backs for stoping; the ledge averaging 2½ feet in thickness. On the mine is a 4-stamp steam mill with Frue concentrators, which save a portion of the sulphurets. Ten tons of ore are crushed daily, yielding $10 per ton, including sulphurets, and 10 men are employed in all capacities.

The Eagle quartz mine is on a parallel ledge, one-half mile west of the Adams & Carter. It is opened by a tunnel on the ledge in 270 feet. The vein varies in thicknes from 2 to 12 feet, and the quartz is much harder, and carries a less valuable grade of sulphurets. There is a 5-stamp steam mill which crushes 8 tons daily on the mines; the ore milled pays, including sulphurets, from $8 to $10 per ton. Six men are employed.

The success of the preceding mines and the adjacent California, which has just erected a small mill, has given considerable impetus to quartz prospecting in this vicinity, and several locations are being actively explored. Though the work done has thus far been on a small scale, a degree of success has been obtained that warrants much more extended enterprises.

Brown's Valley.—On the quartz mines in this district but little more than assessment work has been done during 1882. At the Solo mine the mill crushed one run of 60 tons of ore that yielded $13 per ton. It will be reopened and worked during the coming year.

Smartsville.—Here are the largest hydraulic mines and gold producers in the county. Immense deposits of auriferous gravel are found here, that have already yielded millions of dollars. The mining ground is held by three companies, and known as the Excelsior Water and Mining Company's claims, the Bonanza hydraulic mine, and the Blue Point hydraulic mine. All these have large and continuous water supplies and have been yielding steadily for many years. The Excelsior and Bonanza made very short runs this year, being closed by injunction in the *debris* suits; therefore the annual yield will be largely diminished from this cause.

The gravel here is reported as not being rich enough to pay, being worked by drifting, and as much of the richest hydraulic ground, particularly in the Excelsior claims, has already been worked, the prospects are that there will be no increase in the annual yield.

Camptonville.—This is rather a distributing point and half-way station for the mines of Sierra County than a mining district. At the Weed's Point hydraulic mine, 2½ miles north of Camptonville, there yet remain about 10 acres of gravel 100 feet in depth to work. This claim employs 5 men and uses 400 inches of water, running nine months of the year. This claim pays moderately.

The Brown & Purrington Willow Creek Ravine claim, comprising 157 acres of old tailings and ravine bed, has been fitted up at an expense of $40,000, preparatory to commencing work in the spring of 1883. A bed-rock tunnel 3,000 feet long has been run, and lined with 300 feet of 22-inch sluice boxes; also 4,000 feet of 9-feet wide flume boxes built. When running, 20 men will be employed, and it is expected to take out large quantities of gold.

The quartz mills in the county are as follows:

Name.	Locality.	Power.	Number of stamps.
Mount Hope	Mount Hope	Steam	8
Washington	Hansonville	do	10
Solo	Brown's Valley	do	10
Mark Anthony	Smartsville	Water	8
Adams & Carter	Indiana Ranch	Steam	4
Eagle	do	do	5
California	do	do	2
Seven mills			47

Of these, only those at Indiana Ranch, aggregating 11 stamps, have been in operation during 1882.

The small surface placers scattered over the county have yielded in the aggregate during 1882 about $12,000. The Chinese production has not been very large in the aggregate, not exceeding $50,000.

Though a number of promising new mining claims will commence operations in 1883, and the Indiana Ranch and Brownsville districts probably show a considerable increase in production, yet it is probable that the aggregate yield of the county will be much less for 1883 than for 1882, owing to the diminishing production of the Smartsville hydraulic mines or its being cut off entirely.

CHAPTER II.

NEVADA.

The condition of the mining interests in the State of Nevada has not materially changed during the year, and yet it may be said that a more hopeful feeling is entertained throughout the various counties except perhaps in Storey County.

Mining is every day becoming more and more a legitimate business. People no longer grow wild over reported new and rich discoveries of ore. Prospects are not sold for enormous sums on the strength of geological formation, vicinity of paying mines, or assays of selected specimens of ore, but they bring what the ore in sight is worth. Stock companies are not organized with almost unlimited shares of stock, to extract ore and pay dividends from undeveloped mines of but little permanence. Stock gambling is not so prevalent as formerly, and experience, in many cases dearly bought, has taught the capitalist and the miner what methods of treatment are best suited to the various ores.

In the early days of mining in Nevada, as elsewhere, it was no uncommon thing to see a wet-crushing mill shipped at vast expense to some remote section of the State, only to find that the ores were refractory, and amenable to a smelting or chloridizing treatment.

Nevada is rich in mineral wealth, but to a great extent the ores are base, highly sulphureted, and of medium or low grade.

In the mines of Central and Southern Nevada the richer chloride ores above the permanent water level were easily extracted, cheaply reduced, and produced such large amounts of bullion as to attract universal attention. About the time that the more refractory ores were reached the mines passed into the hands of incorporated companies, whose failure not only proved disastrous to the stockholders, but brought the mines into a disrepute from which they are only beginning to recover.

Very many of these mines, if operated with economy, careful management, and a view to the extraction of bullion rather than to dispose of stock, would amply remunerate their owners for labor and capital expended, and in various portions of the State it is evident that the day for this system of mining is now dawning.

Transportation facilities are also increasing. Three railways, the Eureka and Palisade, the Nevada Central, and the Carson and Colorado, all open sections of country rich in mineral wealth; the latter is being extended still farther south, and the Nevada Central will soon be in direct communication with the various districts of Nye County.

In Storey County a somewhat different condition of affairs exists. On the Comstock ledge a series of small ore-bodies were found near the surface and were worked out. One after another of the companies on whose claims they were brought prominently before the public and enjoyed a brief period of prosperity—the Ophir, Gould & Curry, Savage, Hale & Norcross, Chollar, Imperial, Yellow Jacket, and Kentuck—each had its day prior to 1870, and its history has not been repeated. The Crown Point and Belcher, while they produced largely before 1867, did better subsequent to 1870. Lastly, the Consolidated Virginia and California opened up ore-bodies, the wealth of which has never been exceeded before nor since in the annals of mining in the United States.

Stimulated by the unprecedented amount of ore found along the line of the lode, the various companies have prosecuted their work in sinking deeper shafts and driving drifts and cross-cuts into unknown ground, at an expense totally disproportionate to the results attained.

So far as exploration has developed, no ore-bodies of importance have been found to exist below the 2,000-foot level, and it would seem as though this point was the deepest boundary to the zone of ore-bodies, and yet the explorations have continued to a depth of, in some instances, 3,100 feet.

It is a serious question whether it is advisable to continue operations in these mines. The ledge matter at this depth is of great width, but it contains only small seams and stringers of ore, in most cases of very low grade. Whether by following these they may lead to important ore-bodies is of course unknown, but the search will doubtless be continued so long as the stockholders will furnish means to prolong the work.

The following statement of the assessments upon the shares that became delinquent upon the mineral stock of mineral properties within this State during the year 1882, was made up by the San Francisco Bulletin:

Counties.	Mines.	No.	Amount.
Elko	7	15	$295, 000
Esmeralda	9	10	150, 000
Eureka	4	8	124, 800
Humboldt	2	2	20, 000
Lander	1	2	125, 000
Lincoln	2	3	82, 000
Lyon	1	1	6, 000
Nye	2	5	34, 500
Storey	45	98	4, 480, 100
White Pine	4	9	127, 000
Total	77	153	5, 444, 400

Per contra, the dividend showing for the whole State has been as follows:

Mines.	No.	Amount per share.	Amount.
Bristol	1	$2 00	$14, 000
Eureka Consolidated	4	1 75	87, 500
Exchange	1	03	3, 000
Indian Queen	12	45	56, 250
Navajo	3	75	75, 000
Northern Belle	9	4 50	225, 000
Richmond	2	3 75	202, 500
Total	32	13 18	663, 260

The returns made by the mines to the county assessors of the number of tons and value of the gold and silver ores worked during the year aggregate 330,699 tons, of the value of $7,120,767.25, as shown by counties in the following table:

Counties.	1881.		1882.	
	Quantity worked.	Value.	Quantity worked.	Value.
	Tons.		*Tons.*	
Elko	2, 664	$156, 349 61	4, 199	$333, 784 46
Esmeralda	36, 509	1, 372, 828 53	25, 941	1, 011, 121 62
Eureka	75, 495	3, 074, 980 78	71, 840	2, 453, 306 38
Humboldt	8, 909	76, 298 71	3, 942	42, 597 14
Lander	6, 958	929, 795 89	4, 156	575, 964 48
Lincoln	14, 464	301, 808 89	38, 387	457, 806 56
Lyon	87, 054	395, 151 47	50, 773	182, 210 60
Nye	12, 148	362, 431 54	8, 742	216, 216 62
Ormsby	26, 076	110, 397 88	1, 506	6, 975 13
Storey	108, 976	1, 468, 918 44	114, 611	1, 575, 096 97
Washoe	5, 256	39, 533 42	....	....
White Pine	8, 990	364, 784 37	6, 602	265, 687 29
Total	393, 499	8, 653, 279 53	330, 699	7, 120, 767 25

The production of the State during 1882, as nearly as could be ascertained from actual reports from the mines, express and railway shipments, and returns made by bankers and smelters, was $8,750,000, of which $2,000,000 was gold and $6,750,000 silver. The following is the amount produced by each county:

Counties.	Gold.	Silver.	Total.
Churchill	$5, 000	$3, 000	$8, 000
Elko	35, 000	500, 000	535, 000
Esmeralda	50, 000	1, 470, 000	1, 520, 000
Eureka	835, 000	1, 700, 000	2, 535, 000
Humboldt	35, 000	80, 000	115, 000
Lander	20, 000	1, 000, 000	1, 020, 000
Lincoln	25, 000	430, 000	455, 000
Nye	25, 000	230, 000	255, 000
Storey, including Lyon	920, 000	860, 000	1, 780, 000
White Pine	40, 000	460, 000	500, 000
Washoe	10, 000	17, 000	27, 000
Total	2, 000, 000	6, 750, 000	8, 750, 000

CHURCHILL COUNTY.

In this county some little activity was manifested during the year, not only in prospecting but in developing locations.

Bernice district, situated in the northeastern part of the county in the Clan Alpine Range of mountains, and 10 miles east of the Humboldt Salt Marsh, is a new district, and no work was done in it prior to 1882. The general formation is lime and a variety of slates with dikes of quartzite and breccia.

The Golden Crown mine has a tunnel in on the ledge 300 feet and an incline down 90 feet. The ores are free milling, and average $70 in silver per ton, with a small percentage of gold.

The Silver Ridge ledge is being worked by the owners, and the ores are shipped for reduction. There are four locations on the ledge, in one of which it is reported that ore assaying $1,000 to the ton has been found. The ore shipped to Winnemucca sampled at the Winnemucca reduction works $165 in silver per ton.

The Wild Goose, Great Western, Utah, and Big Chief ledges are being worked, and the ore shipped to San Francisco and Salt Lake for reduction.

The Bernice and Hidden Ruby ledges have each been opened by inclines of 75 feet in depth, and show a good quality of ore.

The Hoyt claim is a north extension of the Golden; a tunnel has been driven on the ledge for 150 feet.

The Oregon mine has been stripped for 1,500 feet, on an incline sunk 50 feet in depth.

There is no mill in Bernice district, but it is understood that one will be in operation by May, 1883.

The district is about 90 miles south of Winnemucca, and there is a good natural road to that place by way of Pleasant Valley and Grass Valley, thus furnishing an outlet to the Central Pacific Railroad. There is plenty of water and an abundance of nut-pine wood.

Old Bolivia, or *Table Mountain district*, is situated in the northern part of the county, in the Silver Hill Range of mountains. Heretofore the mines have been worked for copper and silver, but in May, 1882, valuable nickel deposits were discovered, and upwards of thirty locations made. Two car-loads of the ore were shipped East with satisfactory results. The ore assays from 12 to 60 per cent. of nickel.

The Silver Crown mine has considerable work done upon it, and the ores extracted are shipped for reduction, the average yield per ton being $450 in silver.

From the Linda Jo mine a rich carbonate ore is taken, averaging $900 in silver per ton, and containing 60 per cent. of lead. A shipment of this ore to Salt Lake City yielded $21,000.

A number of claims which have been but little developed give promise of becoming valuable properties.

The Lake Erie ledge, opened by tunnel, is a blue carbonate of copper, yielding 20 per cent. of the metal. It is about 15 feet wide, running north and south, with a dip to the west.

The Lake Huron is 8 feet wide. The course and dip are similar to the Lake Erie. The ore is carbonate and gray copper.

The Lake Champlain ledge is well opened with tunnels. The ore is richer than in the preceding mines, yielding an average of 30 per cent. of copper.

The Lake Superior is a chimney of ore of upwards of 300 feet in diameter, opened by a 60-foot shaft.

Three miles north of the above group is the Tidal Wave ledge, in Cottonwood Cañon, near the dividing line between Churchill and Humboldt Counties. The ledge is 4 feet wide; the ore is carbonate and oxide of copper, assaying 30 per cent. It is opened by a shaft 120 feet deep.

The London ledge in the same cañon is reported to assay 29 to 45 per cent. of nickel.

White Cloud district, south of Table Mountain district, carries large belts of magnetic iron with copper.

The Red Oxide copper mine is an immense deposit between granite and slate. A tunnel has been driven across the ledge showing the copper principally on the hanging wall.

The Carbonate, Stone Cabin, and Nut Pine ledges all show good ore. The Stone Cabin and Nut Pine, in addition to producing copper, are rich in silver and gold.

I. X. L. district, west of White Cloud, has a number of fair-looking prospects on a ledge crossing the mountain from east to west. The ore is galena and carbonate, carrying gold and silver.

The Bayfield Company have sunk a shaft 180 feet deep, and drifted on the ledge for 80 feet. The ore is part milling and part smelting.

Other claims on the lode are the Arcadia, McKenzie, East Star, Maguire, Golden Wedge, Silver Wedge, Iron Point, Spar, True Blue, Twin Sisters, Black Prince, Nevada, Great Eastern, and Mammoth. They have been opened to some little extent, not exceeding 50 feet.

Desert district is in the northwestern part of the county, near the line of the Central Pacific Railroad.

The Churchill Mining and Milling Company own the Empire and Equitable mines, situated about 8 miles from White Plains. The ore is a very peculiar one, consisting principally of oxide of iron charged with gold, silver, and copper. It is treated by pan process. Sal ammoniac, salt, cyanide of potassium, and lime are used in its treatment, and the charge must be cold while amalgamating. The lime is the principal factor, as it destroys the affinity which the iron has for the amalgam. The ore is a very uncommon one, and difficult to handle, requiring great care and judgment in amalgamating. The mill, which is supplied with 6 stamps, 2 pans, and a settler, ran only at intervals during the early part of the year, and since last spring has been idle.

The Gold Hill mine is a new discovery, and promises well. Considerable ore is in sight, which it is expected will be milled at the Churchill Company's mill. It averages $30 per ton.

Desert district is small. The formation is syenite, with a vitreous quartz. Where the mines are, the ore is found in irregular bunches, and it does not appear that the main ledge has as yet been found.

In 1882 this county produced $5,000 in gold and $3,000 in silver.

ELKO COUNTY.

Tuscarora district is the chief mining district in the county and is situated about 50 miles northwest of Elko, the county seat.

The Navajo is now the principal mine of the district, and has made a large production during the year. The main shaft has attained a depth of 450 feet, at which point the company are cross-cutting for the ledge. The vein is from 1 to 14 inches in thickness, and lies in porphyry. The ore is extremely rich; it is not sorted, but everything taken out the full width of the stopes is put through the mill, yielding an average of $114 per ton. The upper levels are producing fine sulphuret ore, containing a fair percentage of gold. A large amount is exposed on the 250-foot level. The indications, at the greatest depth of the mine, are that the vein is increasing in size and richness. The mill is supplied with 10 stamps, which crush at the rate of 1½ tons per stamp. The mill has been much improved in appliances for the treatment of the ore. Another roaster has been added lately, which permitted an improvement to be made in the manner of desulphurizing and chloridizing that has added 4 per cent. to working results, and a saving of 25 per cent. in salt.

The Independence has been opened to the depth of 600 feet, and has produced a large quantity of rich ore, similar in character to that from the Navajo. This mine is under the same management and the ore is worked at the Navajo mill.

The Grand Prize and Argenta are both worked through the Grand Prize shaft. These mines have yielded some good chloride ore, chiefly from the upper levels. During the first part of the year, only the upper levels were worked, and considerable was done in the way of straightening up and retimbering the workings. Much trouble was experienced from a heavy flow of water, but later in the year this was under control and work was recommenced with vigor in the lower levels.

In the Grand Prize there is a large extent of unexplored ground west of the shaft which bids fair to open up well, and work is being prosecuted on the 600-foot level, 130 feet west of the shaft, on a vein varying from 6 to 8 inches in width, which is supposed to be a continuation of the rich ore-body that was lost in the 400-foot level some three years ago. A winze is being sunk on this vein, which is increasing in width as work progresses. The mill is being overhauled ready to start whenever the supply of ore is sufficient to justify it.

The Belle Isle and its extension, the North Belle Isle, continued explorations and some good ore was extracted.

The Elko Consolidated shows two ledges, only one of which has been prospected to any extent. It adjoins the Navajo, and is opened by two inclines, the deepest of which is 125 feet, with drifts to the ledge which carries from 6 inches to 2 feet of pay ore. The company contemplate sinking a new shaft in 1883, which will cut the main ledge at a depth of about 200 feet; in the mean time they are extracting ore and piling it upon the dump. The chief obstacle this camp has had to contend against has been the want of fuel. Heretofore sage-brush has been used almost exclusively, but the country is now pretty well cleared of it for a distance of 15 or 20 miles around Tuscarora. In future a coal supply will have to be obtained from Elko, on the Central Pacific Railroad.

Cornucopia district is still regarded by many as having merits which will sooner or later be developed. The three mines on which machinery has been in operation, the Leopard, Hussey, and Panther, have produced a large amount of bullion, the Leopard alone having shipped over a million and a half. The Hussey, Panther, and Constitution have been relocated, and the assessments are promptly kept up.

The Whitney, Vesey & Co. mill made a small production.

Centennial district is situated about 32 miles north of Tuscarora and has an abundance of wood and water.

The Gray Eagle mine shipped considerable ore to Utah for reduction, the average yield of which was $170 per ton.

Ore worked by the Bullion and Maggie mines averaged $250 per ton. A 5-stamp mill with Frue concentrators is in course of construction, and will be finished by the spring of 1883.

But little work was done in the district. The greatest depth attained was on the Blue Jacket mine, which was sunk to 200 feet. The production of the district was about $12,000.

In *Island Mountain district*, placer mining is conducted almost exclusively. The season was short, lasting only about three months, owing to a scarcity of water. Four hundred miners' inches of water being required, a ditch which will have that capacity is now in course of construction. When completed it will be 4 miles long and will have cost $10,000. It taps a natural reservoir which will hold a supply sufficient to carry on hydraulic work all the year. About 16 men found employment in the district.

The Penrod and Green and French mines took out some gold, and a few Chinamen were also at work. The production of the district during the time work was prosecuted, amounted to $4,523.

The production of Elko County in 1882 was $35,000 in gold and $500,000 in silver.

ESMERALDA COUNTY.

Esmeralda County still occupies a leading place among the bullion-producing sections of Nevada. Messrs. J. I. Wilson, of Pine Grove, and Frank P. Stewart, of Candalaria, have contributed much information relating to Esmeralda.

In the northwestern part of the county the mines are chiefly gold-producing.

Lake district is on the eastern slope of the range west of Walker Lake.

Pine Grove district is west of the range and of the East Fork of Walker River. After a long season of depression, this district appears to be improving. There are three mines of note: the Wilson, Wheeler, and Dolores.

On the Wilson the work of the year was chiefly for development. A new tunnel was driven to cut the ledge at a greater depth. The yield, therefore, was not so large as in former years. The ore is free milling, yielding about $60 per ton. The mine is supplied with a 10-stamp mill.

The Wheeler is situated a quarter of a mile from the Wilson. It is owned by a San Francisco company, who have leased it for three years to other parties. Prospecting only has been done, and no ore extracted. There is a 15-stamp mill on the property.

The Dolores was idle during the year. The ore from this mine is principally of silver.

Cambridge district is on the East Fork of Walker River, south of Pine Grove district. The ores are principally gold-bearing; water is plentiful but wood is scarce.

Southeast of Cambridge is Mount Cory, and 10 miles west of Hawthorne. The Mount Cory mine is on the eastern slope of the mountain, which from its abruptness furnishes excellent facilities for economical working. The Bodie Free Press speaking of this mine says:

"The ore channel has a regular dip to the south and east, and between the walls varies from 30 to 150 feet in width. A large proportion of vein matter is low-grade ore of a milling value of $15 to $40 per ton. Through this low-grade ore, extending from the croppings to a depth of 300 feet, lowest level opened on lode, a vein of exceedingly rich ore, varying from a foot to 6 feet in width, has been developed. Ore is a sulphide of lead, carrying silver in large quantities, the entire vein having a milling value of from $100 to $300 per ton. Plan adopted by the superintendent for developing the mine is that of running a series of tunnels to ledge and then connecting tunnels by means of winzes, which will answer the double purpose of ventilation and a transit for ore from the croppings to 500-foot level, from whence it will be run in cars directly into mill or furnace for reduction. The dip of the ore vein to the south and east at nearly same slope as that of the mountain spur on which it is situated, makes this a particularly easy and economical method of working mine. Three tunnels have already been run to ledge, opening and prospecting it to a depth of 300 feet. A fourth tunnel is now in to within a short distance of ledge, and will cut it in a very few days 108 feet deeper than last. At depth of 300 feet both ore channel and vein of rich ore running through it, are each wider, of a more perfect formation, and ores of a richer character than at any other point in the mine, so that there is every reason to believe that when 400-foot level is opened, a mine almost if not quite equal in value to any in the State of Nevada, will be shown up."

Garfield district is situated 8 miles west of Luning, and contains a number of promising mines. The district is a new one, it being less than two years since its organization, and the mines are not developed to any great extent.

The principal mine is the Farrington, which yields chloride and bromide of silver. The ores are sent to Belleville for reduction.

The Honest John, Delaware No. 1, Delaware No. 2, Lotta, and Dolly Varden are prominent claims.

On the Honest John a shaft is down 140 feet, exposing a vein of high-grade ore of from 15 to 24 inches in width.

In *Gillis district*, which joins Garfield on the north, there are a number of claims undergoing development, among which may be mentioned the Middlesex, Bay State, Yellow, and South Mountains.

Santa Fé district is about 6 miles east of Luning. The ores of this district are, with one exception, of copper.

The Lotta is a small vein carrying galena rich in silver. It has been actively and profitably worked.

Southwest of Luning and near the California line is the old district of *Esmeralda*. The Cortez, Centennial, and Del Monte are the principal mines.

The Cortez has been sunk to a depth of 400 feet, the ore improving in quality.

The Centennial developments are similar to those on the Cortez. This district requires facilities for the reduction of its ores, as well as capital to develop.

Columbus district lies nearly central in the county, and in point of development and production is one of the most important districts in the State.

The progress of the district was long retarded by a great scarcity of water and by excessively high rates for transportation of supplies. To provide a sufficient supply of water the White Mountain Water Company brought water in iron pipes from the White Mountains, a distance of 19¼ miles. The main pipe is 5 inches in diameter, and smaller pipes from half an inch to 2 inches in diameter, distribute the water to the principal mines, to the railroad depot, Metallic City, and Candalaria, the chief town of the district. This work was completed in February, 1882.

During March, 1882, the Carson and Colorado Railroad reached Candalaria, and the long-needed requirement of cheap transportation was supplied.

The principal mines of Columbus district are the Northern Belle, the Nevada Company's mines, the Chief of the Hills, Excelsior, Pedro and Urllo, the Princess, Mount Diablo, General Jackson, New England, Victor, Mount Potosi, George Washington, Enterprise, Metallic-Equator, Lucky Hill, Columbus Consolidated, Saratoga, Holmes, Mountain, Boy Group, and Jim Blaine Group. They are situated within an area of about 2 by 4 miles.

The Northern Belle continues to hold its place as the largest bullion producer in the district, and during the year 1882 paid twelve dividends. It is one of the few mines that have never levied assessments. The following, extracted from the superintendent's report for the year ended September 1, 1882, shows the work done at this mine:

"During the year the mine produced $22,979\frac{1450}{2000}$ tons of ore, of which amount 22,850 tons have been milled, showing a gross bullion product of $928,170.63, or an average of $40.62 per ton."

An average force of 145 men was employed, of whom 80 were engaged in the extraction of ore, and the remainder in general work, prospecting, and improvements.

The underground work in detail was as follows: The main shaft was sunk and timbered for 100 feet, giving a total depth of 800 feet. At this point a station was opened for what is known as the fifth level, from which a main drift has been extended 374 feet, upon which rather slow progress was made, as the formation is a hard, black slate, showing streaks of quartz. On the same level, 110 feet from the station, a cross-cut was started to the north and run a distance of 69 feet, a considerable part of the way in ledge matter, the face being in decomposed quartz giving low assays and carrying heavy iron sulphurets, which are considered a favorable indication. This level is being rapidly prospected. On the fourth level the work consisted mainly in prospecting. The main drift on this level was extended 376 feet and two cross-cuts run, aggregating 99 feet. It was also connected with the fifth level by winze. A second winze was also sunk to a depth of 85 feet, and near the same place an upraise was made 51 feet.

No ore was extracted from the third level. The main drift was extended 106 feet and some prospecting done by cross-cutting and sinking winzes.

On second intermediate a series of drifts were run on the ledge, of a total length of 158 feet. In one of these drifts good ore was found, upon which a winze was sunk 32 feet, showing at the bottom about a foot of very fine ore. The heat, however, was too great, and work was discontinued until cooler weather. On the same level the ledge was cross-cut in several places and an upraise made of 40 feet. Considerable good ore was extracted. There is a large amount of unexplored ground, which will be opened as expeditiously as possible. The second level was a constant and heavy producer of ore during the whole year, and the ore was of high grade.

In the first intermediate extensive prospecting was done, with encouraging result. This level was opened by a series of drifts, showing a total length of 350 feet. In cross-cutting, 253 feet were made, and in upraising, 187 feet.

The first level yielded continuously during the year; 381 feet of drifts were run, and 217 feet of cross-cutting. In an upraise near the center of the mine vein matter 10 feet wide was found, giving low assays, with rich ore on one side assaying $80.

On the twelfth level the work consisted mostly in working over old stopes, from which a small quantity of good ore was extracted.

Good ore was extracted from the eleventh level, in which 262 feet of drifts were run and 105 feet of cross-cuts, several winzes aggregating 109 feet.

The eighth, ninth, and tenth levels have always been a very productive portion of the mine. In the west part of the ninth level a very fine body of ore was encountered, showing a total length of 125 feet, and varying in width from 1 to 13 feet. By raising to the eighth level, it was found to extend a distance of 78 feet and 35 feet above that level. This ore-body was drifted on for 100 feet. A winze was sunk from ninth level, which, at a depth of 30 feet, developed ore on the north side. This was followed, and it opened into a continuation of ore-body found above in places showing a width of 10 feet. After running north in this ore about 60 feet, a second winze was sunk to tenth level, just completed, which is entirely in ore the whole distance, 66 feet. This ore pitches north and west, and gives every indication of going still farther downward. Though not sufficient work has been done on tenth level to determine its extent, still the outlook is very satisfactory, as in cross-cutting the same ore-body was found south of the winze.

The development on these three levels is promising in extent and character of ore, which is a soft chloride, easily extracted and readily milled.

The seventh level also produced considerable ore of a good grade; 300 feet of drifts and 350 feet of cross-cuts were run, in addition to upraising 170 feet.

The mills of the company are located at Belleville, 9 miles from the mine, and the ore is conveyed in cars specially constructed for the purpose by the Carson and Colorado Railroad. During the year, 22,850 tons of ore from the Northern Belle and 3,213 tons from other mines were worked at the mill, the Northern Belle ore yielding 84.8 per cent. of its assay value. This percentage was not so high as that of previous years, owing to the presence of lime. Both mills are in an excellent running condition.

The following statement shows the financial condition of the company on September 1, 1882:

EXPENDITURES.

Dr.

Dividends, twelve (Nos. 52 to 63 inclusive—nine of $25,000 each, three of $12,500 each)	$262,500 00
Interest, exchange, &c	212 17
Insurance ($60,000 on each mill)	4,529 35
Legal expenses	2,748 75
Mine expenses	230,177 24
Mills (two) expenses	328,557 71
General expenses at mine, &c	11,114 28
General expenses at San Francisco (including salaries, &c)	17,040 86
Ore tax for the year ending June 30, 1882	6,163 56
Ore purchases	20,844 78
Taxes (Nevada and California)	4,108 81
Supplies and materials purchased in San Francisco	25,248 85
W. V. Price, superintendent (balance in his hands September 1, 1882)	54 59
Cash on hand September 1, 1882	135,972 86
	1,049,273 81

RECEIPTS.

Cr.

Bullion, 581 bars (Nos. 4,698 to 5,278, gross value $956,099.74, less discount, 14⅙ per cent., which includes freight from Candalaria and United States mint charges, $135,548.17)	$820,551 57
Crushing ore for outside parties	53,772 50
Drafts (outstanding September 1, 1882, being our entire indebtedness)	23,719 60
Spring (sale of water)	2,948 92
Cash September 1, 1881, $183,456.83, less drafts outstanding at that date, since paid, $35,235.14	148,221 69
R. J. Jones, late superintendent, balance in his hands September 1, 1881	59 53
	1,049,273 81

RECAPITULATION.

Cash on hand September 1, 1882, as shown above	$135,972 86
Drafts, outstanding, all told, to September 1, 1882	23,719 60
Actual cash balance September 1, 1882, and all indebtedness paid to that date	112,253 26

The Chief of the Hill mine is the property of the Southern Nevada Company and adjoins the Northern Belle on the northeast. It has been worked to a depth of 300 feet, and has an abundance of high-grade ore in sight. Only exploration work has been done for some time past.

In August, 1882, this company broke through into the Northern Belle's workings, and established the fact that the latter company had extracted a large quantity of ore from ground that belonged to the Southern Nevada Company. It is likely that the matter can be settled only by the courts.

The Princess mine is a valuable property, but at the close of the year was idle and had been so for several months, owing to some misunderstandings on the part of the owners.

The mine was opened in September, 1881. A double-compartment shaft has been sunk upwards of 500 feet, and drifts run to cut the ledges. The first ledge cut through by the shaft was about 3 feet in width, and assays from it went from $45 to $63.81 per ton. At 20 feet below this another vein was cut 32 inches thick, assaying from $2.37 to $16.52 per ton. Below this a stratum of manganese and rotten slate succeeded by slate formation, which, without material change, lasted to a point 420 feet from the surface, at which point a strong seam of clay came in, dipping to the northeast, and was followed by a vein of quartz and manganese giving fair assays. From that point to the present depth of the shaft the material has been quartz, clay, short rotten slate, and manganese, all more or less mineralized, assays from seams of which range from $14 to $83.

The company has a very complete hoisting works. There is a double-acting engine running two reels, to which are attached round wire ropes for hoisting and lowering the cages. The engine is of sufficient capacity to sink to a depth of 1,200 feet. There is no probability that a pump will be needed, as water is not likely to be encountered until a greater depth than 1,200 feet is attained.

A 30-stamp mill is in process of erection, but was not completed by the close of the year. The prospects that the Princess will develop into a valuable mine are very encouraging. The location, with reference to the mineral belt, is of the best, and the croppings and indications on the surface warrant the belief that it will be so.

The company is a close corporation and are also owners in the White Mountain Water Company, which insures a free delivery of an ample water supply.

The Mount Diablo Company were engaged during the year chiefly in development of their mine. Ore amounting to 3,072 tons was milled at the mill of the Northern Belle Company during four months of the year, producing bullion to the value of $217,947. This paid all the expenses of the company and left a balance of $10,478 on hand at the close of the year. Work was carried on in all the levels, but the greater portion was on and below the third level. During the year an aggregate of 4,700 feet of drifts and cross-cuts was run, and 600 feet of winzes sunk. But little stoping was done, and most of the ore that was milled was extracted in the development work performed. The ore encountered in the various drifts and winzes assays from $30 to $500 per ton, and at the close of the year the company had broken up and stored ready for milling 600 tons of ore that will average in working $65 per ton, and also have thousands of tons of good ore in sight in the various workings of the mine.

The development in this mine has been sufficient to establish its richness and permanence. Early in 1883 the company will be ready to ship ore by rail to Belleville, to be worked in one of the mills of the Northern Belle Company. They also contemplate erecting a mill of their own, and will do their full share in increasing the bullion product of the State.

The following from the superintendent's report shows the ore workings for 1882 and also the financial condition of the company:

Total amount of ore worked, 3,072$\frac{1430}{2000}$ tons.	
Assay of ore as per battery sample	$78 43
Actual assay value after adding 4 per cent. for excess of salt used over moisture in ore	78 46
Total assay value of ore, 3,072$\frac{1430}{2000}$ tons, at $78.46	241, 085 22
Total assay value of bullion returned	217, 947 58
Per cent. of silver extracted, 90.4; loss, 9.6.	

Statement of ores worked.

Date.	Tons.	Product.
February, 1882	840	$56, 595 94
March, 1882	1, 000	68, 845 46
April, 1882	1, 000	59, 954 65
May, 1882	230$\frac{1430}{2000}$	32, 551 53
Total	3, 072$\frac{1430}{2000}$	217, 947 58

The following is a statement of the principal materials used at the mine during the past year:

Material used.	Used.	On hand.
No. 2 Hercules powder ... pounds	11, 500	250
Candles ... do	6, 840	600
Fuse ... feet	61, 500	3, 000
Giant caps	35, 000	3, 500
Coal oil ... gallons	260	60
Wood ... cords	145	22$\frac{7}{8}$
Charcoal ... bushels	2, 362	308
Lumber ... feet	8, 084	3, 233
Mining timbers	107	60
Water ... gallons	98, 796	....

FINANCIAL STATEMENT.

Receipts.

From bullion	$217, 949 13
From other sources	200 02
	218, 149 15

Disbursements.

Taxes (bullion, &c.)	$1, 892 94
Bullion discount (including expressage)	32, 331 30
Real estate	928 05
Legal expenses	500 00
General expenses at San Francisco office	2, 259 20
Interest account	367 21
General expense at mine (including labor and mine supplies)	90, 388 72
Transportation of ore and milling same	63, 858 26
Paid overdraft at bank December 19, 1881	15, 145 40
Cash on hand December 18, 1882	10, 478 07
	218, 149 15

The Columbus Consolidated joins the Mount Diablo on the west and comprises four locations, the Secretary, Mountain Queen, Mount Castle, and Leo. This company was incorporated, with 100,000 shares, in 1880, under the laws of California. But little more than assessment work was done on the property until July, 1882, when R. B. Milroy took charge of the work and commenced sinking incline No. 1 on the vein. This incline is now down 70 feet, most of the way in good ore, although in places the vein seems to be somewhat broken up. Owing to bad air it was found necessary to run a connecting drift a distance of 185 feet to incline No. 2. All the workings are now thoroughly ventilated by this connection.

A drift is now in 100 feet west, following the ledge, which shows from 6 inches to 4 feet of $200 ore. In the connecting drift, 95 feet west of incline No. 1, an incline is sunk 50 feet. Here the ledge is solid and well defined, and several tons of high-grade ore have been extracted. From the bottom of this incline, which is known as the second level, drifts have been started east and west. In the west drift, which is in 26 feet, the ore is broken and mixed with country rock. The east drift on this second level follows the ledge 55 feet, which in this direction is solid and well defined. The face of this drift shows 4 feet of solid ore, 18 inches of which gives an average assay of $2,639 per ton. There are about 40 tons of ore on the dump that will assay $200 per ton. No more ore has been taken out of this mine than it was actually necessary to remove in sinking and drifting, leaving the ledge as nearly intact as possible. The superintendent, who is also principal owner, contemplates erecting hoisting works. The mine is one of the best properties in the district.

The Lucky Hill joins the Columbus Consolidated on the northwest. The workings have reached a depth of 200 feet, and are in ore assaying from five dollars to several hundred per ton. A tunnel was run in for a long distance, and the ledge cut about 350 feet from its mouth, and drifts were run in both directions, exposing the ledge. An upraise was made for 300 feet, following the vein, and a well-defined ore-body was developed. At the lowest level the ledge is 30 feet wide and increasing in width. High-grade ore is frequently encountered, and the mine is rapidly developing into a large ore producer.

The Saratoga mine joins the Mount Diablo on the east. Hoisting works have just been completed. The mine is worked through an incline, which is down 180 feet. A test run of a few tons of ore at Belleville yielded a handsome profit.

The Black Bird and O. K. mines, owned by Daniel Malloy and Frank P. Stewart, join the Saratoga on the east. Little more than assessment work has been done, but it has been sufficient to demonstrate the existence of a well-defined ledge with a pay streak of from 6 inches to 2 feet in width. The ledge crops out on the surface, and can be traced for a distance of 2,000 feet. While assessment work was progressing, about 25 tons of ore, yielding from $75 to $150 per ton, were extracted and worked.

The Paddy O'Neil joins the Black Bird and O. K. on the south. This mine is a new discovery. Ore found on the surface assays from $40 to $900 per ton. An incline has been sunk to the depth of 80 feet on the ledge, which is clearly defined and shows good ore all the way down. Several tons of high-grade ore are sacked and ready for shipment.

The Great Eastern is on the first hill east of and distant from the original Mount Diablo mining claim between 1,200 and 1,500 feet. The claim consists of 1,500 linear feet, and is located on the main ledge of the district. The ledge can be traced through the location from one end to the other by large croppings the most of the way. There is on the mine a prospect shaft, directly in the center, 125 feet in depth. The shaft is nearly perpendicular, and is located about 60 feet north of the croppings of the ledge, which dips to the north. At a depth of 40 feet, the shaft being all of the way in ledge matter, an ore vein of 12 inches was cut. Directly underneath was another ore vein 6 or 8 inches thick, and directly under this is another from 4 to 6 inches thick. These three veins are virtually one, and will average in width 22 inches.

The Mountain Boy group is situated on the east end of the mineral belt. An incline has been sunk 65 feet on the ledge and shows ore all the way. In the bottom of the incline and next to the hanging wall is a streak of ore which assays $1,150 per ton. So far as developed this is a well-defined contact vein, lying between porphyritic slate or shale on the hanging wall and porphyry on the foot wall, and is the only contact vein discovered in this district. On the foot and hanging walls there are from 2 inches to 1½ feet of porphyritic clay. A cross-cut has been run from the bottom of the incline to the foot wall. Between the hanging and foot walls it is a distance of 18 feet; the gangue carries from $8 to $45 per ton. The prospect shaft is on the chloride croppings 2¼ miles east of the Mount Diablo works. The group is owned and operated by Frank P. Stewart, and comprises an area of 600 by 1,500 feet.

The Jim Blaine group joins the Mountain Boy group on the west, and comprises a tract of 600 by 1,500 feet. It is the property of Frank P. Stewart. An incline is down 16 feet on the ledge, showing from 6 inches to 2 feet of ore assaying from $52 to $270 per ton. There is a large amount of ore on the surface that will yield over $100 per ton.

The Mountain Girl joins the Saratoga on the south. A prospecting shaft has been sunk to a depth of 150 feet. Several promising bodies of ore were cut through in sinking the shaft; they were of rather low grade.

The General Jackson lies southeast of the Mount Diablo. Explorations during 1882 have demonstrated the fact that the ledge improves as depth is attained, in size, compactness, richness, and frequency of ore deposits.

The New England has a shaft 51 feet in depth and an incline 80 feet in length, from which point levels have been run east and west on the ledge, producing good ore. There is an air-shaft which furnishes a circulation of pure air throughout the workings. The mine has been sufficiently opened to show that there are permanent veins of ore running through it, and of a good average quality. A small streak of the ore in the vein is quite rich, and continues all the way down so far as the workings have been extended. Ore has been reduced yielding $16,000 at a time when hauling to the mill was at the rate of $20 per ton and milling $40 per ton, so that none but the richest could be utilized, leaving on the dump ore that would have milled $40 per ton. There is in the ore vein a large quantity of ore that will yield from $30 to $40 per ton, which would afford a profit of from $8 to $18 per ton over the cost of extraction, hauling, and milling.

The Victor, George Washington, and Metallic-Equator have all been explored during 1882 with encouraging results.

The Victor Company's property consists of three mining locations, the Victor, Chloride, and Magnet.

The Victor lies west of the Northern Belle mine, on the same belt and vein. A tunnel has been run in at right angles with the course of the ledge, tapping it at about 700 feet from the mouth on the Victor location. At the intersection of the tunnel and ledge a drift was run from that point westerly 160 feet along the course of the ledge, and from the same point another drift was run easterly 360 feet, also along the edge. A winze was sunk at the end of the west drift, on the vein, to the depth of 40 feet, developing high-grade ore.

Another winze was sunk easterly 20 feet from the end of the drift to a depth of 105 feet; 200 feet still further east another winze was sunk in the ledge 150 feet in depth. About 100 feet westerly from this winze an incline has been carried to the surface, showing an almost continuous body of ore, all pay, of from 4 to 12 feet in width.

South from the Victor location, and running parallel to the Victor, lies the Chloride. The main tunnel taps the ledge in the Chloride also. An incline from the surface taps the Chloride location to a distance of 700 feet; also, connections have been made with the Victor main tunnel. Four levels have been run on this location from 100 to 200 feet in length.

There are many good mines in Columbus district comparatively idle for want of means to erect mills and hoisting works. By a judicious outlay of capital they would not only become producing mines but would doubtless well repay their owners.

Oneota district is situated in the White Mountain Range, about 25 miles southwest from Candalaria.

The Indian Queen is the principal mine of this district and produced bullion steadily during 1882. The mine is well developed, having been opened to a depth of over 400 feet with large ore reserves in sight. The ore is very refractory although rich, and is reduced by a 5-stamp mill and Howell roasting furnace. The company was involved in expensive and annoying litigation, which happily has been settled, and the mine should now be able to pay a fair profit to the stockholders.

Montezuma district, 45 miles southeast of Columbus district, is one of the oldest and most important mining sections of the county.

The Shawmut Company own about thirty claims, comprising the chief locations of the district; they have all been more or less developed, and some ten or twelve may be regarded as good mines. The ores carry a large percentage of lead, and can be best treated by smelting, though good milling ores are also found.

The Shawmut Company erected a smelter in 1881, but a short time after its completion the water supply suddenly failed and compelled the company to move the smelter some 5 miles further from the mines, necessitating hauling of ores and fuel. During 1883 it is expected that operations will be resumed and a continuous run made, as there is a large quantity of high-grade ore on hand as well as in sight in the mines.

Esmeralda County, while rich in minerals, is to a great extent a barren desert, and the want of water and fuel, added to difficult and laborious wagon transportation over sandy roads, has retarded its development; many mines which under more favorable conditions for mining would have been paying properties have remained idle, or, at best, only assessment work has been performed.

The Carson and Colorado Railroad is now removing some of the drawbacks to successful mining, and as better transportation facilities are offered to remote sections we may look for corresponding increase in the mining industry.

This county produced, in 1882, $50,000 in gold and $1,470,000 in silver.

EUREKA COUNTY.

Safford district is comparatively a new district, being less than two years old. The country is chiefly trachyte, but the hills have been well worn down and are covered with *débris*, the original formation being exposed only in places.

The principal mines are the Onondaga, Belcher, Key West, Jay Bird, Contention, Mohawk, Hancock, Cumberland, &c. The ledges have generally a north and south trend, and are of a fair width, carrying in most cases rich chloride ore. At first the ores were free milling, but as depth was attained they became refractory.

The Onondaga was idle early in the year, but development work was commenced later, with encouraging results. A shaft sunk at the mouth of the tunnel uncovered, at a depth of 30 feet, a body of black sulphuret which differs from most of the other ore of the district, and assays $200 per ton. It is reported that late in the year very rich ore, assaying nearly $850 per ton, was found. This ledge had a remarkably strong outcrop, and although the ore from the surface did not have a promising appearance, yet it assayed fairly.

The Belcher is a southern extension of the Onondaga, on which prospecting work was done during the year.

The Key West has a strong vein 5 feet wide. The ore is largely galena, assaying high in silver. At a depth of 70 feet drifting was commenced on the ledge.

The Jay Bird lies east of the Key West, and the character of the ore is similar to that of the latter mine, although it does not yield so largely in silver. It promises, however, to be equally as valuable a mine.

The Contention is opened by shaft and tunnel, with a fine showing of ore. A considerable amount was shipped.

The Mohawk is opened about fifty feet in depth. The ore at first taken out was of low grade, but has rapidly improved in quality with depth.

The Hancock is being prospected with encouraging results. A 4-foot ledge has been exposed by a tunnel, showing galena and sulphurets.

In the Cumberland a ledge of 18 inches yielded ore assaying in some cases as high as $500 per ton.

Other locations of this district are the Zanola, Comet, Vermont, Flower Pot, and Lucky Jim.

Mineral Hill district is in the eastern part of the county, near the line of White Pine and Lincoln Counties.

Mr. H. G. Catlin, general manager of the Christie Mining Company, reports that but little work was done in the district during 1882 except by the Christie Mining Company of New York, which in October last acquired possession of its property. It now owns all the mines of the district which are either at all developed or have made any bullion production, and were formerly owned by the Taylor and Austin Companies. The company has also a 15-stamp mill, water rights, pipe lines, reservoirs, buildings, &c., making a complete plant for treating their ores. The mill is now being put in order, and it is expected will start early in January on ores from the company's mines. It is supplied with 8 pans and a Stedtefeldt furnace; the latter will not be used, as a preliminary roasting is believed to be unnecessary. The ores are free, working to 80 per cent. of their assay value, and are treated, as are similar ores in other places, by amalgamation. The supply seems abundant, and it is expected that large shipments of bullion will be made during 1883. The company has a quantity of tailings, amounting to about 30,000 tons, which it will probably begin to work in 1883.

The district is 5 miles from a station on the Eureka and Palisade Railroad, giving easy and rapid communication with other places, and reasonable transportation expenses on supplies brought in. Water is abundant except for power; wood, $5.50 per cord. Excellent salt of superior strength and purity is made at salt springs of extent and importance, situated 12 miles distant. Wages are about the same as at other places in the State. The cheapness with which the ores of this district can be treated, their free-working character, and the large supply, warrant a belief that a large and steady bullion production will be made.

From the, to some extent, imperfect records in the possession of the company, it appears that the total production of the mines now owned by the Christie Company has been upwards of $3,500,000 in silver and gold. A considerable amount has been produced by other mines in the district, and a large quantity of ore has been sent for treatment to Eureka and other places.

Cortez district is nearly due west of Mineral Hill district and near the line of Lander County.

Of this district Mr. S. Wenban reports that the Garrison mine is the chief bullion producer. It was located at an early day—in the spring of 1864—but has since then been covered by a United States patent. There are eleven locations in the group, which are owned and worked by Mr. Wenban; the principal work, however, has been done upon the Garrison. The formation is lime, and the vein is what is termed a pipe vein. The mine is opened by a perpendicular shaft 300 feet deep, but it is worked chiefly through the tunnel, now in 1,900 feet; the present ore-body is 1,200 feet below the surface; the various drifts and cross-cuts aggregate 9,000 feet. During the year the workings were through ground that was somewhat broken, but by the close of the year more solid ground was reached, and the ore-body was found to be more regular and increasing in size; the ore was also of higher grade. The mine is equipped with a 10-stamp mill and a Buckner chloridizing furnace. The mill was continuously run and shipments of bullion made with regularity during the year.

The Silver Fleece is also one of the oldest mines of the district, having been originally located in 1863 by one of the parties who discovered and organized the district. It was subsequently relocated by S. E. Ducrummin, and has been worked at intervals during 1882. It is opened to a depth of 50 feet from the surface by tunnels and drifts aggregating about 300 feet. The ores are rebellious, and cannot be reduced by milling; they therefore have been shipped to Salt Lake City and Eureka for smelting treatment.

The Naiad Queen, also located in 1863, is owned and worked by H. G. Hughes. It is opened to a depth of 60 feet by about 350 feet of drifts. The ore is similar to that in the Silver Fleece mine, and being refractory is also shipped to Eureka and Salt Lake for smelting.

The production of this district during 1882 was $99,825.

Diamond district is located about 18 miles north of Eureka. The principal mines are the Mammoth and Cumberland, which are the property of the Enterprise Company of San Francisco, with E. E. Phillips as general manager.

The Mammoth mine is opened by an incline about 60 feet in depth, and a tunnel 300 feet in length has been run upon the ledge, exposing a vein of from 2 feet to 12 feet in width. The ore carries a large percentage of lead, and is of rather low grade, averaging about $30 in silver per ton.

The Cumberland is about a half mile distant from the Mammoth, and about the same amount of work has been done upon it; the vein is not so strong as in the latter, and contains a less percentage of lead. The company contemplates erecting smelting furnaces in 1883 for the reduction of their ores. There is an abundance of wood and water in the district, and the cost of smelting, it is estimated, will not be over $15 per ton.

Eureka district is the chief district in Eureka County, and also one of the most important mining centers in the State.

The town of Eureka, built in the cañon between Diamond and Prospect Mountains, is the principal town in Eastern Nevada, and the surrounding mines on Prospect Mountain, Ruby Hill, and Adams Hill have by their large output of ore and bullion not only rendered themselves famous, but have attracted the attention of capitalists both at home and abroad.

The Richmond Consolidated and Eureka Consolidated are the two great mines of the county, although there are at least 200 others in the district that have yielded more or less ore, and many of them were producing mines in 1882.

The Richmond Company, which is an English organization, owns twenty-three locations on Ruby Hill—the Richmond, Tip Top, and Lookout being the most important. In the latter two the largest and richest ore-bodies have been found. They lie on the northern and northwestern slopes of Ruby Hill, and on the northwestern side of the hill are the original openings also of the Richmond.

The ores from this great mine are argentiferous carbonate of lead carrying galena and auriferous arsenical pyrites. The gangue is composed chiefly of oxide of iron, which also yields silver and gold; it gives to the ore the ferruginous appearance characteristic of Eureka ores, and is a valuable constituent in the smelting process by which the ores are reduced. The hanging wall of shale appears more or less broken, while the foot wall of quartzite is more compact. In places it runs nearly flat and then pitches for some distance, and again becomes nearer horizontal, thus forming a series of ore-bodies of varying size but uniform richness.

Of the extent of the workings of this mine no information can be given, as no reliable reports have been received. Operations were steadily conducted during the year, the furnaces were in blast and the shipments of bullion were made with a regularity and extent that betokened successful and profitable operations.

The Eureka Consolidated continues much in the same condition as at the time of my last report. The various drifts and levels have been extended and development continued to open up reserves. The extraction and reduction of ore has been continuous and large. The old workings of the mine have yielded their full quota of ore, and new bodies have been found and opened which have fully sustained the character of the mine as one of the chief bullion producers of the State. I append the last annual financial statement of the company:

RECEIPTS.

Proceeds 3,010 tons base bullion	$1,343,608
Settlement for damages	100,000
Miscellaneous	6,037
Superintendent's drafts	3,365
Cash, October 10, 1871	144,857
Total	1,597,867

DISBURSEMENTS.

Mine account	$521,693
Smelting account	319,652
Construction account	308,179
General expenses	25,595
Expense, San Francisco account	10,037
Transfer agency, New York	3,225
Attorney's fees, court costs	34,016

Freight, refining, &c	$259,087
Superintendent's drafts	19,903
Dividend account	87,500
Cash, October 10, 1882	8,979
Total	1,597,866

RESOURCES.

Cash on hand	$8,979
269 tons base bullion, approximate value	71,349
Supplies on hand	29,491
Charcoal	25,920
Total	135,739

LIABILITIES.

Superintendent's drafts outstanding	3,365
Bills for hoisting works, not due	39,000
Total	93,375

The Albion mine, on the northwestern slope of Ruby Hill, adjoins the Richmond property. It has been prospected for a long time, and with the most encouraging results. The main shaft was located several hundred feet south of the ore channel, which necessitated long drifts to reach the point where ore could be found. The deepest workings of the mine are 600 feet, but the main working, or 325-foot level, is the point at which the principal ore developments have been made. As in other mines on Ruby Hill, the ore is high-grade carbonates, galena, and black sulphuret. A new smelting plant has been constructed by the company, which is equipped with two galena smelters of a nominal capacity of 30 tons each, and a 40 horse-power engine. The ore is hoisted from the mine, weighed, and run in cars to the rock-breaker, which is so arranged that the crushed rock falls into a bin, from which it passes to the floor below, close to the domes of the furnaces. The mine contains a large extent of unexplored ground, which, from present indications, should develop large ore-bodies, and with economical and energetic management it should become a paying property.

The Jackson and Phœnix mines yielded enormously when first opened. Work has not been systematically conducted, and they have not been prospected at all lately, except by tributers.

In the Jackson the lower levels are under water. There are undoubtedly large amounts of high-grade ore in these mines. The tributers who have operated here have made good wages.

On Adams Hill, which lies northerly from Ruby Hill, there are many mines which give fair promise of becoming valuable.

The Altoona is worked under lease, and while the developments are small, the main shaft being down not over 75 feet, a considerable amount of good ore has been extracted.

The Horace Tony mine is also operated under lease. It is being opened by two shafts, one of 30 feet exposing a fine body of galena, and the main working shaft of 70 feet depth yields ore of the value of $240 in silver and gold.

At the Silver Lick a new double-compartment shaft is being sunk, from which a drift is being run to strike the ledge.

The Rio Mimbres is down 50 feet, with a 40-foot cross-cut, on hard quartz that will yield $15 per ton. Through this quartz veins and stringers of rich carbonate ore are found.

The Herculean is an extension of the Silver Lick, and is being worked for quartz, which is used as a flux by the Albion smelters. It is found in irregular deposits, and assays from $20 to $100 per ton.

The Bowman Company has extracted some good ore, which was worked by the Eureka Consolidated Company.

The mines of Adams Hill, if worked to depth, may become valuable mines, as it appears to be the opinion of many that, judging from the formation, the same character of ore-bodies as are found in Ruby Hill exist here, but at a depth that will require capital and perseverance to reach. The same opinion is entertained with respect to Prospect Mountain, which at different points is being entered by tunnels that daily demonstrate that larger ore-bodies exist at a greater depth than are found near the surface.

The Eureka tunnel was commenced in 1878, and has been in continuous operation. It has been driven 2,700 feet into the mountain from Goodwin Cañon, but the principal workings are about 1,000 or 1,200 feet from the tunnel mouth; considerable good ore has been extracted, and the prospects are encouraging. Steam hoisting machinery has been purchased, and will be the means of making a large increase in the output of ore. General P. E. Connor is the general manager.

The Prospect Mountain, Atlantic and Pacific, and Monumental tunnels are also being driven into the mountain.

The Prospect Mountain tunnel has penetrated the mountain a distance of something over 2,000 feet. In its course it has cut through several mining locations, both patented and unpatented, and exposed several veins of ore of more or less promise. It is now about entering the patented lines of the Silver Connor, and its face, while still in line, shows by heavy iron stains and other indications unmistakable evidence of near approach to a mineral-bearing vein.

A fine ore-body was encountered 1,700 feet from the tunnel mouth, within the patented lines of the Avon. The ore is chiefly carbonates, and assays from $100 to $400 per ton. It is found in a gray limestone formation, and its extent has not been determined; the indications are good for it proving to be of considerable size; it is very irregular, pitching below the tunnel level as well as rising above the top. A cross-cut has been started northerly on this ledge formation, and will be run in some 10 or 20 feet, when, if nothing of greater value than has yet been found is developed, further work at this point will remain in abeyance until the tunnel is pushed ahead to its final destination, when this and other veins cut in its course will be systematically explored. The Avon has been bonded to the tunnel company, and the ledge cut within its patented lines will at the proper time receive thorough prospecting.

At the Silver Connor mine large bodies of low-grade ore are found, which have remained untouched, only the high grade being raised.

The Alexandria Company have some of the oldest locations made on Prospect Mountain, but heretofore they have been but irregularly worked. The Alexandria mine is on the same limestone belt as the ore-bodies in the Eureka tunnel.

At Secret Cañon the Geddes & Bertrand is the chief ore producer. The mill reduces about 80 tons per day, and the ore supply is so large that the mill can be kept running continuously. The principal working is on the 150-foot level, and the chamber excavated is in a breast of ore 4 feet deep and 50 feet across; the ore is easily broken down, and averages about $40 to the ton. The leaching process was introduced for the treatment of rebellious ores, which are abundant in this mine, and it is reported that the results were highly satisfactory.

The Hodgdon mine, adjoining the Geddes & Bertrand, is an old claim which has been operated during the last two years. At first a body of high-grade ore was found near the surface which was worked out, but by following a small seam of rich ore it led to a large body of low-grade ore, which is valuable on account of its proximity to the Geddes & Bertrand reduction works.

The Page & Corwin mine, from which a large amount of ore was extracted some time ago, has been idle.

The Queen mine is developing into a valuable property. The present workings show two veins running in opposite directions, and at the point of intersection on the 150-foot level there is a fine body of ore that will work on an average $225 per ton.

The Western Globe and Tip Top mines are being opened up with fine prospects. An irregular vein of quartz going down 60 feet, the present depth of workings, is 5 feet wide and contains ore that can be worked by smelting or mill process. There are 150 tons of this ore on the dump that will work $160. A tunnel is being run to tap the vein at the bottom of the shaft.

The Empire series of mines has a quartz vein going down with a barely perceptible showing of ore on the surface, which widens out rapidly as depth is attained. At less than 20 feet a 4-foot vein is disclosed. This property has been sold to an Eastern company, which, it is understood, will shortly proceed with developments.

The following is an official statement of the production of Eureka County during 1882:

Name of mine.	No. of tons extracted.	Total gross yield.	Total cost of production.
Albion	2, 807	$106, 901	$74, 212
Altoona	1	198	227
Antelope	2	145	149
Alexandria	10	324	463
Atlantic and Pacific	20	421	608
Bowman	262	19, 300	21, 724
Banner	133	6, 109	6, 170
Barton	18	356	505
Bullwhacker	121	3, 921	5, 523
Black Point	3	330	451
Bald Eagle	55	3, 124	3, 299
Contention	9	1, 000	1, 000
Dug-out	147	11, 738	12, 179
Dead Broke	42	2, 408	2, 848
Eldorado No. 2	49	2, 936	3, 563
Eureka Tunnel	1, 204	74, 989	74, 151
Eureka Consolidated	22, 355	1, 010, 211	844, 605
Excelsior	128	3, 818	4, 027
Extension	1	62	68
Garrison	980	70, 670	74, 480
Gilham	7	491	178
Geddes & Bertrand	8, 193	124, 251	124, 388
Hamburg	18	544	673
Hoosac	51	1, 460	1, 615
Home Ticket	57	1, 502	1, 686
Hunter	3	359	373
Herculean	7	106	173
Idaho	322	11, 209	9, 979
Irish Embassador	13	2, 468	2, 904
Industry	3	90	101
Jackson	628	30, 037	23, 330
Kentuck	9	1, 215	1, 258
Lone Pine	3	54	132
Lizzie L	4	156	252
Member	217	4, 602	5, 291
Macon City	167	5, 746	5, 676
Matamoras	106	4, 867	13, 659
Mountain Boy	28	3, 268	3, 049
Moline & Fraser	8	134	192
Mayflower	16	256	282
North Macon City	14	1, 568	3, 475
Onondaga	31	2, 378	1, 978
Oriental and Belmont	63	1, 530	1, 837

Name of mine.	No. of tons extracted.	Total gross yield.	Total cost of production.
Phenix	333	$12, 580	$13, 499
Prospect Mountain Tunnel	55	1, 394	1, 746
Paul Pry	109	4, 866	3, 368
Richmond	30, 456	873, 749	753, 580
Ruby-Dunderberg	1, 754	61, 307	68, 891
Republic	20	402	600
Silver Connor	147	10, 163	7, 706
Silver Lick	266	11, 322	10, 414
Seventy-Six	64	4, 635	6, 340
Silver King	34	524	844
San José	16	1, 020	1, 084
Silver West	2	108	132
Star	1	118	100
Williams	63	8, 071	3, 797
Williamsburg	269	8, 712	7, 260
Wide West	11	172	207
War Eagle	9	250	209
Total	64, 924	2, 511, 844	2, 212, 051

TAX-PAYING MINES.

Name of mine.	Net yield.	Tax.
Albion	$38, 656 16	$1, 004 28
Banner	179 80	4 67
Bowman	2, 233 92	58 08
Geddes & Bertrand	1, 362 95	35 44
Eureka Consolidated	149, 031 61	3, 874 83
Excelsior	153 00	3 98
Eureka Tunnel	17, 362 41	451 42
Garrison	6, 424 94	169 07
Idaho	329 83	24 14
Jackson	6, 708 97	174 44
Macon City	500 00	13 00
Member	350 64	9 11
Mountain Boy	287 60	7 46
Onondaga	400 09	10 40
Paul Pry	1, 582 91	41 15
Richmond	141, 493 41	3, 678 83
Silver Lick	920 93	23 94
Silver Connor	1, 719 85	44 72
Williamsburg	1, 528 97	39 75
Total	371, 827 30	9, 668 71

The total production of the precious metals in Eureka County in 1882 was $835,000 in gold and $1,700,000 in silver.

HUMBOLDT COUNTY.

The condition of the mining industry in Humboldt County remains much the same as during the previous year.

Rebel Creek district, in the northeastern part of the county, is a large district and has been but little prospected, and offers a fine field for exploration. There appear to be four distinct belts running through the district. The first or lowest on the foot-hills carries copper and silver; the second is chiefly of iron, yielding both gold and silver; the third is argentiferous lead; and the fourth free gold-bearing ores.

The mines have been developed to some extent and small amounts of ore extracted and awaiting reduction.

A new mill was erected by Harland & McColley, but was not completed in time to make a trial run before winter set in, and as the roads from the mines to the mill were obstructed by snow and ice no ore could be hauled, and milling in consequence has been delayed until spring.

In *Willow Creek district* development has been steadily prosecuted.

The Iowa mine has a ledge from 5 feet to 11 feet wide. It has been opened by a tunnel of 175 feet in length showing ore in the face; the ore yields both gold and silver.

The Ohio is the oldest location in the district and has produced remarkably high-grade ore, yielding as much as $1,000 per ton.

The Emma is reported to be equally as good a mine, the ledge being large and well defined.

At Paradise Valley considerable activity was displayed during the year.

The Wild Goose mine, which had been prospected by a tunnel to some extent, has been lying idle. It shows a fair amount of milling ore and is a promising mine; it is owned chiefly by parties who have had no experience in mining and who fear to risk capital in developing it.

The Bullion mine is on the same lode and adjoins the Wild Goose. It has been operated more extensively than any other mine of the district but never was systematically or regularly worked. Of the present condition of the workings, Mr. J. Y. McCurdy, of Paradise Valley, states that the mine was originally worked by an open cut some 20 to 60 feet deep, running into the mountain. A tunnel was run at right angles to the vein and workings. A drift was then run north in the vein some 400 feet to the Wild Goose line, showing several bunches of ore, none of which have been prospected, except one chimney about 60 feet in length, which is near the Wild Goose line. It is from 3 to 4 feet wide in the drift, but in rising up the vein has widened to about 9 feet. Six feet are base in iron, sulphur, and a little antimony, and the other 3 feet of the vein on hanging wall, contain quite free milling ore, and carry chloride and native and horn silver. There is a large body of quartz in this chimney, and it carries very good ore.

In the drift of the Wild Goose line a winze has been started in the vein, and is down 38 feet below the tunnel level and shows good ore. Eighty-six feet south of the line another winze has been started, and is down 44 feet, and is in good ore, showing that the chimney continues down 120 feet. South of the 44-foot winze a winze has been sunk 72 feet in the vein, and a drift run north 125 feet to connect with the 44-foot winze. Both winze and drift show a strong, well-defined vein, with bunches of excellent ore, and no doubt an extensive ore-body exists in the mine at this point.

A drift was started south in the lead from where the tunnel entered the vein, and a chimney of ore found and worked out to near the surface, some of it paying as high as $100 to the ton. This drift has been extended the past summer, and a very rich and valuable chimney of ore discovered, about 60 feet in length and 6 to 14 feet in width. There is a break in the vein for about 20 feet after passing this chimney, and the drift is now showing good ore in the face.

The ores are both free milling and refractory, and have been worked by wet crushing without any preliminary roasting treatment, and only about 50 per cent of the assay value of the ore has been saved by amalgamation. The tailings are therefore carefully saved, and when oxidized can be reworked and an additional amount of their contents secured.

The Bullion and Wild Goose are both very favorably situated for working, as they lie parallel with a deep cañon, from which a tunnel driven into the mountain for 500 or 600 feet would tap the ledge at about the same distance below the present workings.

The Paradise Valley mine is situated a few hundred yards east of and parallel with the Bullion and Wild Goose. The mine has been practically idle during the past year, only assessment work having been performed, and some low-grade ore from the waste dumps was run through the Bullion mill. The mine is opened by four tunnels from 200 to 400 feet in length, the lowest tunnel cutting the ledge 400 feet below the surface. The low-grade ore is free milling, but the high-grade is refractory, and the company own a mill on Mountain Creek, about 5 miles from the mine, which is equipped with a 10-stamp battery and a White & Howell furnace. Formerly this mine was a large bullion producer.

On the Live Yankee a tunnel is being run to cut the ledge, and the indications for ore are good.

The Mount Rose was opened by a San Francisco company, which a short time after suspended operations.

The Red Deer and Mayflower have both been prospected to some slight extent.

In *Dun Glen district* work continued on the Auburn. Exceedingly rich specimens of free-gold ore have been taken out of this mine.

In *Star district* the De Soto mine, situated near Star City, is the principal mine. It remained idle for a number of years and was considered to be of little value until Mr. William Woolcock assumed the superintendency and pushed work forward with vigor. Shipments of ore have yielded exceedingly high returns.

Mr. Edward D. Luxton has furnished the following:

Indian district is located on the mineral belt known as the Black Hawk Range, which extends from the Humboldt River, near Hill City, a distance of about 50 miles, and abounds in gold, silver, copper, lead, and antimony. Why this valuable extent of territory has been overlooked and rejected by miners and capitalists I am at a loss to understand; better prospects of good mines, very many of high-grade ore, cannot be found in the State. The few properties upon which money has been expended have been remunerative, and would continue to be so if mining was conducted on economical and true business principles.

Upon this belt are located the Sheba, De Soto, Arizona, Heming, Inskip, Moonlight, Sunlight, Black Hawk, Concord, Eagle, Eureka, and other claims equally valuable.

The richest silver ore ever found in the State was taken from the Moonlight mine in 1870–'71. This mine was patented and sold in 1872 to a gentleman in San Francisco, and since that time not one dollar has been expended on it. In fact, not one of the above-mentioned properties has been really developed, and in no instance below a depth of 200 feet. The eleven millions in ore said to have been produced by the Arizona, the six millions by the Sheba and other properties, were all taken out within 200 feet of the surface; that is, simply worked for the ore in sight. Pumping apparatus would be required in many of these mines to sink deeper.

The Vandewater Gold and Silver Mining Company, organized under the laws of New York, owns the Eagle, Troy, and other claims on the south side of Spring Valley Cañon, and is the only company mining and milling in Indian district. This company has a 15-stamp mill, two hoisting works, and during the last year has constructed a double-compartment shaft, run 300 feet of tunnels, and developed several large bodies of ore, some of which is free milling and is worked in the company's mill, but a large percentage of the silver ore will require roasting or smelting for which there are no facilities in this district. It is the intention of some gentlemen familiar with the wants of this district to erect a small smelter the coming summer on a location near the Vandewater property.

The greater part of the ore on this mineral belt is refractory, and, to be profitable, must be worked on the ground until the Central Pacific Railroad tariff is more reasonable than at present.

In the immediate vicinity of the Vandewater mines are two gulches, called Spring Valley Gulch and Dry Gulch, from which upwards of $900,000 in gold dust has been taken by Chinamen. These placer diggings extend to all the gulches upon this belt. The work is done in rockers, the water being scarce, yet notwithstanding this disadvantage good wages can be made.

Mr. L. F. Dunn, of Spring Valley, reports the shipments of bullion from Vandewater Cañon as $415,700 in placer gold and also about $5,000 in gold and silver bullion from Eagle mill.

In *I. X. L. district* a company was formed for the purpose of erecting a mill and furnace on the East Star and Bayfield mines.

The production of the county in 1882 was $35,000 in gold and $80,000 in silver.

LANDER COUNTY.

To Mr. M. J. Farrell, of Austin, I am indebted for much late information respecting the chief districts of Lander County, and also of districts of the adjacent county of Nye.

Lewis district is situated in the northern part of Lander County, and beyond doubt is a valuable mining locality. For two years it has suffered from a stock speculation not intended to develop the mines, which has operated much to the disadvantage of the district, and now it is struggling against an undeservedly bad name to regain the position of a good camp to which it is fairly entitled by the amount and quality of its mineral deposits.

The Starr-Grove mine is one of the chief mines of the district, and during the early part of the year considerable ore was extracted and worked at the Eagle mill. Subsequently the mine remained idle for some months, but it has been lately reported that work was shortly to recommence.

The Eagle, northeast of the Starr-Grove, was worked principally by tributers, and with good success.

The Highland Chief Company, located south of the Starr-Grove, completed their new mill during the year. It is a 40-stamp, dry-crushing mill, provided with all the improved appliances for treating refractory ores. The ore, after being broken, passes through rotary driers, and is automatically fed to the batteries. After the ore is pulverized it is conveyed by elevators to the chloridizing furnaces, and from there it is distributed to fourteen pans. Seven settlers receive the amalgamated pulp.

At the Betty O'Neal work was successfully carried forward; not only was considerable ore extracted and worked, but developments looking to the permanence of the mine were systematically conducted. A heavy flow of water taxed the machinery to its full capacity, and it was in contemplation to introduce a larger pump before sinking to a greater depth. The ore extracted was reduced at the mill of the Highland Chief Company and at the Eagle mill.

The Morning Star mine resumed work during the year, and arrangements were made for erecting a 10-stamp mill at the forks of Lewis Cañon.

Galena district is situated in the range of mountains across the valley west from Lewis district about 14 or 15 miles. The mines here have been intermittently worked for a long time, and have produced a considerable amount of bullion in times past. Besides numerous silver-bearing ledges it has one large ledge in which gold predominates. It is now in the hands of a New York company, and will likely be developed shortly. From the richness of the ore it should become a good producer of bullion.

There is also in the district a copper mine of value, which has been shipping copper in the shape of ore matte for several years.

Reese River district.—This important mining district is situated in the Toiyabe Range of mountains in the southern part of Lander County, and is about the center of the State of Nevada. It was discovered in 1862, but the circumstances of its discovery and subsequent history have been so often told that it is unnecessary to repeat them. The veins are true fissures in gneiss, and although small are numerous and rich. The ore is generally antimonial silver, what is usually termed ruby silver predominating.

The mineral belt is about a mile in width from east to west, and, with occasional interruptions, about 7 or 8 miles in length from north to south. The trend of the ledge is about northeast and southwest, and the pitch or dip is about 25° to the northeast.

On Lander Hill, just north of Austin, where the principal mines are located, two belts of mineral extend diagonally or north and south across the veins; that to the eastward being rich and pure, while that to the westward, called the base belt, is of a much lower grade and carries much base metal. The mines in the vicinity of Austin have been worked only one-third as deep as those of the Comstock, but although the ore veins are narrower they are more regular and continuous, and hold out as they commenced at the surface, still narrow, but exceedingly rich. The lowest levels attained are showing well in rich ore. The 1,200-foot level of the Paxton incline, the lowest of all, is being opened. The station is being cut out for lateral drifts to follow the ledge each way from the incline, and the ledge not only shows large and rich in either direction, but also at the bottom of the incline. This indicates a very gratifying degree of permanency and increased assurance of future prosperity. The 600-foot level Farrell ledge carries good ore in both east and west drifts, that in the east side being much the strongest. About 100 feet of excellent ore has been run through on this level.

Until within a few years past a considerable portion of the product of the district was derived from the rich surface deposits of chloride ores taken out by numerous parties of limited means. These deposits were soon exhausted, and the owners not being able to follow the veins below the water line the claims have been gradually absorbed by the Manhattan Silver Company until at the present time that company owns much the larger portion of the rich belt and also the only mill now running in the district. They reduce all their own ores, as well as all the custom ores produced, which latter amount to about one-fourth of the product of the district.

The Manhattan mines are worked partially by hired labor at $4 per day, and partially by the tribute system, the latter producing the higher grade of ores, as they are more carefully assorted. It is not uncommon for first-class ores produced by the tributer to assay $3,000 and over to the ton, and even $5,000 per ton has been reached.

The average value of all ores worked in the district has gradually increased as depth is attained, until it is now nearly $300 per ton.

The mill of the Manhattan Company is dry crushing, and is equipped with a Stedtefeldt furnace for chloridizing the ores.

The base belt contains what would be considered in many places rich ores, but on account of the difficulty and expense attendant on reducing them they have hitherto been but little worked.

Austin went through the experience common to all mining camps, of inflation and relapse, but was fortunate in recovering from the depression sooner than most others. The revival dates from 1868. A considerable amount of bullion was taken out prior to that time, of which there is now no record to be found. Since then the annual production has been about $1,000,000, sometimes exceeding that amount and again falling a little short of it. The Manhattan Company's books show, since 1868, a total production of $15,611,611. It is safe to place the entire production of the district at $20,000,000.

The product for 1882 was $878,250 from 3,135 tons of ore, giving an average yield of $280 per ton.

In 1881 the production was $1,053,741 from 4,183 tons of ore, an average of $263 per ton.

The town of Austin contains from 2,000 to 2,500 inhabitants and has been uniformly prosperous, which is a rare thing for a mining town.

Yankee Blade district is about 3 miles north of Austin and is on the same mineral belt. It is included in the estimate given of the length of the belt of 7 or 8 miles. The formation is identical with that on Lander Hill, having the same country rock (gneiss) and the same numerous small rich veins. The district labors under the disadvantage of having a large amount of water; not more, perhaps, than could be managed and controlled by large companies provided with heavy and expensive pumping apparatus, but too much for the surface or chloride miner who heretofore has worked the claims. Even in this small way of mining, and with the crudest appliances, a large amount of money has been taken out in the past. The district offers much greater inducements to the capitalist than Lander Hill presented but a few years ago.

Amador district is north of and adjoining Yankee Blade district. Here some rich ledges are found which have yielded considerable bullion. The country rock is slate, and the richest ledge of the district is found where the slate meets the gneiss of Yankee Blade district. This is known as the Chase ledge and is a contact vein. It has been traced for over a mile in length, has been opened in many places, and proved rich wherever opened. The ore is a black sulphuret, containing much native silver, and averages throughout over $400 to the ton. Thus far it has been worked only by chloriders, but even in this imperfect manner, and worked at intervals, it has produced about three-fourths of a million of dollars. It has never been touched below the permanent water line. A few men working on the east end of the ledge have taken out, with imperfect machinery, about $150,000 during the year; by far the larger part came from a small space less than 300 feet deep.

Kingston district is in the Toiyabe Range of mountains, in the southern part of the county, about 25 miles south of Austin.

The principal mine, or that on which most work has been done, is the Victorine, which is being operated in a small but economical way until capital can be secured in England to work it properly. This mine is without doubt a valuable property, but it is another instance of mismanagement. About two years ago it was sold to an English company at an excessive price, and a large working capital was raised and expended in the construction of unavailable mills and works. When ready to commence operations an attempt was made to work all that came from the mine with a mill that would not save half the gold and silver from their best ores, and a failure was the consequence. During the last summer one of the owners took charge, and by an application of strict business principles is bringing the mine to the front again as a bullion producer.

There are many more mining districts and good mines in Lander County worthy of mention, but they have been practically abandoned for many years on account of their distance from railroads and bases of supply.

The Nevada Central Railroad is now in operation from Battle Mountain, on the Central Pacific Railway, to Austin, but it requires a little time for attention to be attracted again to a section even after it has been reopened by easy methods of access. The road will probably be extended shortly to Gold Park, Ione, Ellsworth, Downieville, and other points in the adjacent county of Nye, which will in time make themselves known.

The production of Lander County in 1882 was $20,000 in gold and $1,000,000 in silver.

LINCOLN COUNTY.

In *Bristol district* the Bristol Silver Mining Company continued operations during the year. The Mayflower mine, which is their chief property, has reached a depth of 500 feet. Considerable work was done in running drifts to connect with the winzes, and also to work the mine into good shape, a matter that had not been attended to as it was being developed and ore extracted. The chief workings in the mine were in the upper levels, where there is a large amount of low-grade ore, as the hoisting facilities were not adequate to operate the lower levels. The mill, which is supplied with 12 stamps, chloridizes and amalgamates the ore; the results do not exhibit a very close approximation to the assay value, only from 70 to 80 per cent. of the silver being saved.

The Day mine has been rapidly growing into prominence during the year. This mine has been opened to a depth of 780 feet. The ore is in chimneys of irregular size and dip, and averages $200 to the ton. Drifts have been run every 80 feet, and the ore-body, which was first struck on the 620-foot level, was found to continue to the 780-foot level, increasing in size with the depth.

At the Tempest mine, owned by the Gilmer Saulsbury Company, work was prosecuted with great vigor and a high-grade ore-body was encountered which, as developments proceed, promises to grow into large dimensions. A new engine was erected during the year.

At the Starry Night, Noonday, Low Vale, and Stonewall Jackson some little work was done, with fair prospects.

At *Pioche* but little was done. The Raymond and Ely, which in its early days was worked to great profit, paying a total of dividends of $3,075,000, made but one shipment of 10 tons of ore from what is known in their mine as the Black ledge, which netted $800. The ledge is reported to be 40 feet wide and can be easily worked, but the owners do not for some reason appear to desire to continue operations.

The Bullionville Smelting Company has been engaged for three years in working the tailings from the Raymond and Ely mine, and have extracted in that time about $400,000. They use eighteen concentrators to prepare the tailings for smelting.

Highland district is located 7 miles west of Pioche. Mr. J. Anderson reports that there are eight mines in this district. But little work was done during the year.

The Last Chance was sunk to a depth of 35 feet and $6,000 realized. The vein is from 1 to 3 feet in width, and the ore assays from 70 to 300 ounces to the ton and carries from 15 to 30 per cent. of lead.

The Arizona mine is a flat ledge running north and south, with a vein of 3 feet in width, yielding ore that assays 40 ounces of silver per ton and 20 per cent. of lead.

The Mississippi lies north of the Arizona; the vein is 3 feet wide and assays 45 ounces of silver and 30 per cent. of lead.

The Hamburg is opened by a shaft and tunnel on the ledge, with a fair prospect in the face of the drift.

The Eagle mine, on the west side of the mountain, has a shaft of 50 feet in depth, the ore from which will work $70 in silver and 30 per cent. of lead.

The Mendha mine is owned by the Day Company and is down about 200 feet. A force of 20 to 30 men were employed during the summer extracting ore for smelting, but as it was not sufficiently rich in lead to run with ores from their other mines, operations were suspended and the men were transferred to the Chisholm mine.

The Chisholm mine yields ore that assays from 30 to 40 ounces of silver to the ton and contains 25 per cent. of lead. It is used as a flux in the furnaces of the Day Company.

About 5 miles west of Highland the Bullionville Smelting Company have two iron mines, from which they obtain the iron used for fluxing in their smelters. The ore contains 70 per cent. of iron and assays $5 in silver per ton; about 10 tons are extracted per day.

In *Pahranagat district*, south of Pioche, a 5-stamp mill was started in 1881, but disagreement among the owners caused the mill to suspend operations, and the best ores, those from the Green Monster and Baxter mines, are shipped to Bullionville.

The Hicks Silver Mining and Milling Company have done nothing with their property during the year except surveying for patents for the Hurricanes Nos. 1, 2, and 3, and the Fifth of July mines.

The Green Monster mine has a shaft of 300 feet in depth, and several drifts run on the vein. Only a small force was at work and the returns were light.

The Baxter mine was located in September, 1881, and was lately opened. The vein runs east and west, and is about one foot wide. A run of about 6 tons of ore at the furnace yielded 255 ounces.

The Nona mine is opposite to and parallel with the Baxter. It has a vein of about a foot in width. On the east end it is milling ore and on the west smelting ore, the cropping carrying 92 ounces of silver and 27 per cent. of lead.

Tem Pahute district has done nothing during the year, although there are good mines in the district.

The Wyandotte mine, owned by the Wyandotte Company, is opened by an incline of 160 feet, showing a strong vein; 12 tons of ore shipped to Tybo yielded $62 per ton.

The Sterling mine is down 300 feet, and the ore works about $300 to the ton. There are about 200 tons of ore on the dump that assays about $100 per ton.

There are several locations upon which no work has been done although the croppings give fair assays. The Tem Pahute assays $377; the Monarch, $36; the Asphodel, $62. This district suffers from a scarcity of water, there being none nearer than 8 miles.

Yellow Pine district is a new district, located, in the latter part of 1882, on the Big Timber or Charleston Mountain, about 150 miles south of Pioche, the ores, carrying both gold and silver, assaying from $10 to $30 in gold and $25 in silver per ton. Wood and water are plentiful, and the quality of the ore is sufficiently high grade to pay for working.

El Dorado Cañon is in the extreme southern part of the county. Two mills are now running and on a paying basis. The principal mines are owned by the Southwestern Mining Company, of Philadelphia, but no reports have been received of their operations.

In the southern portion of the district the chief mines are the Morning Star, Silver Legion, Silver Eagle, and January. During the year these mines produced $20,000 in bullion and shipped about $8,000 worth of ores to San Francisco.

The expenses of reducing or shipping ores from this district are so great that little can be done until better and cheaper facilities are offered.

I am indebted to Messrs. John Baxter and James Cronan, of this county, for much of the foregoing information.

The production of the county for 1882 was $25,000 in gold and $430,000 in silver.

NYE COUNTY.

Gold Park district is situated in the Shoshone Range of mountains, in the northern part of Nye County, and is about 35 miles from Austin. The mines here were first discovered in 1863, but have been relocated. The veins are fissures and contain gold and silver in a gangue of white quartz, the gold predominating. They are of good size, very rich in places, and undoubtedly could be made to pay handsomely if properly worked. There is a large percentage of base metals in some of the ores, which make them better for smelting than for milling when a suitable flux can be obtained.

The principal mines were sold to an Eastern company, which built an ordinary gold mill to work what were largely smelting ores, and as they ran everything that came out of the mine through the mill the result was that the best assays were in the tailings. Work was subsequently discontinued, and in consequence the district received a bad name, from which it has not yet recovered.

Ione district is situated in the same range of mountains, about 20 miles south of Gold Park. This is an old district, and has produced considerable bullion in the past. The veins are fissures, resembling those of Gold Park. The mines are in the hands of poor men, who are unable to work them properly, and are waiting for capital to come to their assistance and provide machinery. A number of chloriders have been at work taking out small amounts of rich ore.

Although this camp has been under a cloud for several years, and has probably suffered as much from mismanagement as any other section of the State, the richness and extent of its mines will some day give it a high rank as a bullion-producing district.

Grantsville district is also in the Shoshone Range of mountains, about 10 miles south of Ione. This district has produced a large amount of bullion, taken principally from the Alexander, which is the chief mine. It presents an immense body of low-grade ore, most of it too poor for profitable milling, but it could be easily and cheaply concentrated. In proper hands and operated with capital and energy, it would without question be a great mine. The mine has been idle for over a year, and it is reported that the owners are endeavoring to effect a sale of the property in Europe.

The Brooklyn is another good mine that is now idle.

In the Centennial some work was done early in the year; the drifts in both the upper and lower levels showed fair ore, and it was contemplated by the management to erect hoisting works and sink deeper upon the ledge, but towards the close of the year operations were suspended.

This district contains some exceedingly large ore deposits, but they will have to be worked on an extensive and economical scale to make them profitable investments. There are a number of prospects that might develop into good mines, but as a rule they are held by their owners at such extravagant figures that capital is driven away to other sections.

Downieville or *Mammoth district* is in the northwestern part of the county. The Downie mines, comprising five locations, are the principal producing mines of the district. They are located in a low range of hills adjoining Gabb's Valley, at an elevation of about 500 feet above the valley. The formation is limestone with a shale hanging wall; no foot wall has yet been found. The ore is carbonate and galena. The mines were worked for nine months of the year 1882. The remaining three months were spent in erecting hoisting machinery and building a smelting furnace for the reduction of the ore. The engine and boiler are of 80 horse-power, and the buildings, including shops and offices, are of a substantial and commodious character. The furnace has a daily capacity of 25 tons, and there is sufficient power for another of like capacity. The working shaft has been sunk to a depth of 380 feet, and at the depth of 355 feet is connected with an incline sunk on the lode.

The general formation and the character of the ore are similar to those of the Richmond and Eureka Consolidated mines on Ruby Hill, Eureka County.

But a small force of about 15 men were engaged during the nine months that operations were in progress in running levels and opening new ground. In this time 1,370 tons of ore were extracted, averaging in value 46 ounces of silver and $6 in gold per ton. The average amount of lead was 34 per cent.

The cost of mining during the year, including dead work, was $24.75 per ton of ore extracted, and the average cost of smelting was $12.30. Charcoal is used in the furnaces, and costs 25 cents per bushel, and nut-pine wood costs at the works $6 per cord. At the close of the year there was a large ore reserve, and the owners contemplate increasing the force at work, sink the main shaft deeper, and extract much larger quantities of ore during the year 1883.

The Esta Bueno mine in this district is incorporated by a London and San Francisco company, and was in operation for eight months of the year. Only a small force was employed. The ore is quartz, carrying silver, antimony, and lead, and requires a roasting process to obtain satisfactory results. It averages from 20 to 30 ounces of silver, with a small percentage of gold, to the ton. An assessment has been levied upon the stockholders, and operations have been suspended. During the year about $12,000 worth of bullion was produced, of which $2,000 was gold.

The Last Chance, Marble Falls, Piute, and Mayflower have all been bullion producers, and are considered to be valuable properties, but were idle during the year.

The Wide West is a new location made in June, from which two men extracted 30 tons of ore and shipped it to San Francisco, producing an average of 100 ounces of silver and $20 in gold per ton.

There are several other locations in the district that give fair promise of developing into remunerative mines, but capital will be required for that purpose.

Globe district is a new district, organized during the summer, and is situated southeast of and adjoining Downieville district. Several promising locations were made, but little work has as yet been done. The ores are carbonate and galena, carrying 80 ounces of silver with a little gold per ton.

In the adjoining district of *Lodi* but little work was done during the year.

The Lodi mine has a large body of low-grade carbonate ore in sight, but it cannot be profitably worked at the present rate of expenses for mining and reduction.

Ophir Cañon, situated in the same range of mountains as Austin, and about 50 miles south of that place, was formerly known as *Twin River district*, and has lately been reopened. At one time it produced considerable bullion.

The principal work is being done by an old-time miner, who knew the value of the mines in this district. A 20-stamp mill was erected during the summer, and shipments of bullion have commenced.

Summit Cañon, a few miles north of Ophir Cañon, is another mining district, famous in the early days for rich ores. It is again being worked on a small scale and in a careful manner.

In *Washington district*, near the line of Lander County, is the Tiger mine, situated in San Juan Cañon, originally located in 1861. The owners sunk an incline to a depth of 60 feet, but water came in faster than it could be handled, and the mine lay idle until November, 1881. Since then a tunnel has been driven 160 feet, cutting the ledge 100 feet below the surface. On the ledge drifts have been run west 55 feet and east 80 feet. At this level the ledge is upwards of 25 feet in width, of sulphuret and carbonate ores. A shipment of the carbonate reduced at Salt Lake yielded $100 per ton. The owners contemplate erecting a 10-stamp mill and steam hoisting and pump works.

In *Belmont district* the outlet is encouraging. Work has continued satisfactorily at the Belmont mine.

The Eureka mine, which was lately opened, is showing exceedingly rich chloride ore. The ledge is about 1 foot wide, but increasing as depth is attained.

I am under obligations to Mr. P. Downey, of Downieville, and Mr. M. J. Farrell, of Austin, for information respecting mining districts of Nye County.

The county's production during 1882 was $25,000 in gold and $230,000 in silver.

ROOP COUNTY.

Roop County is the extreme northwestern county of the State, and has not hitherto appeared as a bullion-producing section, although in very many portions the county is highly mineralized. Mining districts have been organized and claims located, which in some instances have been partially developed, but the attention of capitalists has not been attracted to the county, and its advancement as a mining section has been slow.

Cottonwood district is about 80 miles north of Reno, on the Central Pacific Railway, and about 15 miles east of the Buffalo Salt Works.

Mr. B. F. Murphy, of Sheephead, reports that about one hundred locations have been made and recorded in the district, most of which show a good prospect on the surface.

The formation of the country is slate and bird's-eye porphyry, with limestone in some portions. The district is claimed by men of limited means who are working in a very moderate way.

The Homestake has been opened to a depth of 100 feet, showing a ledge 6 feet wide at the bottom of the shaft, the ore from which assays from $15 to $1,927 per ton. No ore has been worked or shipped from this mine, there being no mill in the district, and the nearest reduction works are 125 miles distant.

The Hornet is a promising claim. A vein 2 feet in width has been sunk upon for 20 feet, with ore assaying from $30 to $500 per ton. Three tons of assorted ore shipped from this mine to San Francisco sold for $132.50 per ton.

The Black Bess has a ledge 3½ feet wide, ore from which has assayed as high as $2,000; but little work has been done upon it.

The Luke Blackburn, adjoining the Black Bess, has a vein of about 18 inches, which is equally as rich as the latter. It has been opened by a tunnel in about 200 feet, which has not, however, struck the ledge, which it is thought will be cut in another 100 feet. Two tons of unassorted ore from this mine, worked by the Lyon Mill and Mining Company, produced $67 to the ton.

The Gray Eagle, has a ledge 2½ feet wide and ore assaying from $20 to $400 per ton; 25 pounds of this ore worked at Dayton yielded at the rate of $132 per ton. A tunnel driven 160 feet has not yet reached the ledge.

Miller mining district is about 14 miles east of Cottonwood. There are some good prospects here, but no work was done during 1882, and the district is nearly deserted and most of the claims open to relocation.

Veraville district is about 80 miles northeast of Cottonwood district, but no reliable information has been received from this section.

STOREY COUNTY.

In this county there has been no material change in the condition of the mining interests, and at the close of 1882 the outlook for any discovery of large ore-bodies on the Comstock was no more favorable than it had been at the commencement of the year, neither was the financial condition of the various companies in operation better at any period of the year than at the beginning. Work was continued either in exploring new ground or extracting small amounts of ore from the old workings. In some of the mines sinking progressed, although not to any great extent, the great depth attained having made it too costly an operation. New levels were started, and the usual drifts and cross-cuts were run and winzes sunk in the fruitless search for ore. There was not a month in the year when the mines did not furnish some ore from which bullion was extracted, but the total proceeds were not only expended in keeping the mines in operation but nearly $5,000,000 additional were called for from the stockholders for the same purpose.

Not a single mine on the Comstock has paid a dividend for over two years; the last was by the Consolidated Virginia in August, 1880. Forty-five mines called for assessments as follows:

Name of mine.	No.	Amount.
Alta	2	$108,000
Alpha Consolidated	2	30,000
Andes	3	75,000
Belcher	3	104,000
Best & Belcher	4	201,600
Benton Consolidated	2	48,600
Bullion	4	160,000
Caledonia	1	25,000
California	5	486,000
Chollar	4	140,000
Consolidated Imperial	1	50,000
Consolidated Virginia	2	324,000
Crown Point	1	25,000
Crown Point Ravine	1	4,500
Exchequer	1	25,000
Fairfax	1	5,000
Gould & Curry	3	162,000
Hale & Norcross	4	252,000
Hartford	1	2,100
Iowa	1	3,000
Julia Consolidated	1	22,000
Justice	2	42,000
Lady Bryan	1	25,000
Lord of Lorn	1	5,000
Leviathan	1	25,000
Mexican	4	352,800
New York	3	35,000
Niagara	1	12,000
North Gould & Curry	2	45,000
Ophir	2	201,600
Original Gold Hill	1	4,500
Original Keystone	1	50,000
Overman	2	86,400
Phil Sheridan	1	5,000
Potosi	3	112,000
Prospect	1	10,000
Savage	6	308,000
Segregated Belcher	2	12,800
Silver Hill	1	16,200
Sierra Nevada	4	400,000
Scorpion	3	45,000
Trojan	1	5,000
Union Consolidated	2	200,000
Utah	5	110,000
Yellow Jacket	1	120,000
Total	98	4,480,100

The foregoing assessments were levied during the year as follows:

Months.	No.	Amount.
January	6	$244,400
February	14	631,000
March	7	406,600
April	12	623,600
May	6	282,400
June	11	459,500
July	6	169,400
August	6	260,200
September	8	570,800
October	6	219,000
November	9	350,800
December	7	262,400
Total	98	4,480,100

This has not been without effect upon the market value of the shares of stock, and the shrinkage in value is discouraging, to say the least, to all interested in mining operations.

The following comparison shows the San Francisco prices of shares in fourteen representative companies at the beginning and close of the year and the relative value of the total stock in the respective companies at the same periods:

Company.	Price per share.		Market value of stock.		Shrinkage.
	January 1.	December 31.	January 1.	December 31.	
Alta	$4 20	$0 25	$453, 600	$27, 000	$426, 600
Best & Belcher	7 87½	3 90	787, 500	390, 000	397, 500
Belcher	1 80	70	187, 200	72, 800	114, 400
California	30	20	162, 000	108, 000	54, 000
Chollar	1 20	1 15	134, 400	128, 800	5, 600
Gould & Curry	4 05	1 80	437, 400	194, 400	243, 000
Hale & Norcross	1 65	1 05	184, 800	117, 600	67, 200
Mexican	9 87½	2 80	1, 066, 500	302, 400	764, 100
Overman	1 65	10	190, 080	11, 520	178, 560
Ophir	6 00	1 80	604, 800	181, 440	423, 360
Sierra Nevada	9 87½	2 80	987, 500	280, 000	707, 500
Union Consolidated	14 87½	3 20	1, 487, 500	320, 000	1, 167, 500
Utah	6 37½	1 50	127, 500	30, 000	97, 500
Yellow Jacket	3 35	1 10	402, 000	132, 000	270, 000
Total	....	....	7, 212, 780	2, 295, 960	4, 916, 820

The deepest working on the Comstock is the joint winze of the Ophir and Mexican mines, which was sunk to a depth of 3,100 feet. But little ore was found at the bottom, and that was of very low grade. This might be said of the lower workings of nearly all the mines. Instead of the ore increasing in richness with the depth, and so compensating for the increased cost of its extraction, it has become poorer, and although the cost of deep mining has been reduced from year to year by improvements in mining and pumping machinery, yet at the great depths attained the ore is practically worthless, the cost of extraction so far exceeding its value.

These mines have all been kept in operation by the hope of again encountering ore-bodies similar to those which rendered the Crown Point, Belcher, Consolidated Virginia, and California mines famous, and work will be prosecuted as long as the stockholders are willing to pay an amount sufficient for that purpose. An extended review of the condition of individual mines would be of but little value; practically their workings are the same.

At the Utah mine, on the north end of the ledge, nothing of note occurred in the operations of the year. An examination of the last annual report of receipts and disbursements shows that the work was carried on exclusively by assessment of the stockholders. No dividends have ever been made, and the development of the mine has been by forty-two assessments, amounting to a total of $1,360,000.

RECEIPTS.

Assessment No. 35	$40, 000 00
Assessment No. 36	40, 000 00
Assessment No. 37	20, 000 00
Assessment No. 38	20, 000 00
Assessment No. 39	30, 000 00
Total	150, 000 00

DISBURSEMENTS.

D B. Lyman, superintendent	$328 33
Nevada Bank	107 26
General expense	1,676 15
Office expense	667 37
Interest and exchange	806 27
Advertising	639 90
Loss and gain	6,070 22
Supplies	24,853 58
Team expenses	831 50
Salaries and wages	76,809 10
Surveying	162 50
Taxes	1,267 79
Books, &c	61 88
Legal expenses	23 85
Assaying	9 75
Wood and timber	25,438 76
Transportation, &c	2,817 62
Water and ice	5,712 25
Real estate	603 25
Cash	1,062 67
Total	150,000 00

The Ophir mine extracted during the year 4,268 tons of ore, which yielded $89,638, an average of about $21 per ton. This was all taken from croppings not more than 30 feet below the surface. In the deeper exploration of the mine, 16,144 tons of waste rock were raised. This portion of the work was conducted chiefly on the 2,700 and 2,900 foot levels, and in sinking the joint winze to the 3,100-foot level. This level is 3,346 feet below the croppings of the mine, and is the deepest point at which mining operations are actively carried on anywhere in the country. The indications are that the vein is narrowing, which is considered more favorable for an increase in the amount of ore.

The following financial statement is from the annual report of the superintendent:

RECEIPTS.

Balances from last statement	$1,553 99
From sundry mines for labor	59,671 40
From sundry mines for supplies, &c	51,136 01
From San Francisco office—drafts on president	288,113 05
Total	400,474 45

DISBURSEMENTS.

Salaries and wages	$176,603 41
Supplies and miscellaneous expenses	163,478 59
Office expenses	564 16
Water and ice	8,012 60
Taxes	4,230 85
Legal expenses	601 00
Exchange	791 00
Milling	38,416 07
Assaying	1,483 62
Sutro tunnel, royalty on ore	2,956 78
	397,138 08
Balance cash on hand	3,336 37
Total	400,474 45

Gross expenses	397,138 08
Received for labor, supplies, &c	110,807 41
Net expenses	286,330 67

At the Mexican mine 219 tons of ore were raised and 15,717 tons of waste. The ore was taken from the 2,700-foot level, and the winze sunk below that point. The work above the 2,700-foot level was confined to necessary repairs and to maintain drainage and ventilation. The superintendent in his report for the year ending December 1, 1882, says:

"The Sierra Nevada, Mexican, and Union shaft has not been sunk to any greater depth during the past year, the work in the shaft being confined to making the necessary repairs. Arrangements are being made to increase the pumping capacity of this shaft 50 per cent. by substituting seventeen pumps in place of the fourteen now in place. This change will be made at a slight expense, as the pumping engine on the surface is of sufficient power to perform the additional labor without alteration.

"Our explorations during the past year have demonstrated the fact that by the judicious use of the diamond drill the position of water-belts can be determined, and either avoided or their flow controlled, and by maintaining a proper system of ventilation no extraordinary difficulty is experienced in carrying on our work at these great depths. The Comstock vein in the Mexican ground on the 2,700 level shows a width of at least 800 feet. The vein-matter consists of porphyry, quartz, and clay, through which streaks of ore showing some assay value are found. The stratification from the 2,700 level down on the east side of the vein as exposed in the winze sunk from the 2,700 level, and the joint Ophir winze from the 2,900, shows a dip approaching to the vertical. Assuming that the west foot wall of the vein keeps in its regular dips to the east of forty-five degrees, a narrowing up or concentration of the vein would be the result, which may prove a favorable indication."

The following is a statement of the receipts and expenditures:

RECEIPTS.

Balance from last statement	$256 26
From San Francisco, office drafts on president	314,400 00
From Nevada Bank (overdraft)	3,645 03
Total	318,301 29

DISBURSEMENTS.

Salaries and wages	$108,819 66
Supplies and miscellaneous expenses	128,918 26
Sierra Nevada, Mexican, and Union shaft proportion of expenses	77,390 37
Exchange	1,572 00
Legal expenses	601 00
Total expenses	318,301 29

The California and Consolidated Virginia mines were at one time the most prominent mines in the State. The California paid a total in dividends of $31,510,000, and the Consolidated Virginia $42,930,000. During the year the former produced only $10,136 in bullion, and the latter $1,901, and yet the work has gone on, exploring new ground and keeping old workings in repair. It will not be without interest to produce the total production of the Consolidated Virginia from 1873 to 1883:

Years.	Gold.	Silver.	Total.
1873	$314,288 68	$331,293 49	$645,582 17
1874	2,063,438 13	2,918,045 92	4,981,484 05
1875	7,035,206 54	9,682,188 22	16,717,394 76
1876	7,378,145 36	9,279,504 11	16,657,649 47
1877	6,270,518 68	7,463,500 39	13,734,019 07
1878	3,770,007 98	4,226,745 13	7,996,753 11
1879	1,198,319 68	1,283,039 15	2,481,358 83
1880	1,045,413 92	711,122 57	1,756,536 49
1881	91,889 71	52,253 72	144,143 43
1882	997 98	903 33	1,901 31
Total	29,168,226 66	35,948,596 03	65,116,822 69

During this period there were fifty-three dividends paid, as follows:

Years.	Dividends.	Total.
1874	8 of $3 on 108,000 shares	$2,592,000 00
1875	2 of $3 on 108,000 shares	648,000 00
1875	10 of $10 on 108,000 shares	10,800,000 00
1876	3 of $10 on 108,000 shares	3,240,000 00
1876	9 of $2 on 540,000 shares	9,720,000 00
1877	8 of $2 on 540,000 shares	8,640,000 00
1878	4 of $2 on 540,000 shares	4,320,000 00
1878	2 of $1 on 540,000 shares	1,080,000 00
1879	5 of 50 cents on 540,000 shares	1,350,000 00
1880	2 of 50 cents on 540,000 shares	540,000 00
Total		42,930,000 00

The following is the financial statement of the Consolidated Virginia mine for the year ended December 31, 1882:

RECEIPTS.

Gross product	$1,901 31
Assessment No. 17	162,000 00
Assessment No. 18	161,561 10
Bullion samples	1 50
Assay office (Virginia, Nev.)	565 34
	326,029 25

DISBURSEMENTS.

Cash in Nevada Bank	$92,101 90
Cash in Virginia (Nev.) office	2,541 07
Cash in San Francisco office	623 95
Bullion on hand and unsold, assay value	1,901 31
Virginia office expenses	824 85
San Francisco office expenses	5,049 50
Team account	5 00
Hauling and freight	99 62
Books and stationery	1,273 25
Advertising	3,388 50
Company stock	438 90
Suction fan	7,741 92
Balances outstanding last meeting	2,232 38
Hoisting	2,136 80
Taxes	1,687 90
Compressed air	7,488 50
Bullion discount	175 52
Interest and exchange	1,192 36
Bullion freight	6 70
Legal expense	37,943 37
"C. and C." shaft	98,200 00
Supplies	6,896 98
Salaries and wages	52,078 97
	326,029 25

The bullion production of the California mine was from the croppings' The following shows the total production of this mine:

Years.	Gold.	Silver.	Total.
1876	$6,490,380 64	$6,910,460 76	$13,400,841 40
1877	9,384,050 66	9,535,844 32	18,919,894 98
1878	5,552,585 48	5,396,493 45	10,949,078 93
1879	1,333,511 39	1,243,461 31	2,576,972 70
1880	547,484 52	342,558 91	890,043 43
1881	82,146 10	39,961 16	122,107 26
1882	5,111 22	5,025 06	10,136 28
Total	23,395,270 01	23,473,804 97	46,869,074 98

During the above period the following dividends were paid and assessments levied:

DIVIDENDS PAID.

Years.	Months.	Number per share.	Amount.
1876	May to December, inclusive	8 of $2	$8, 640, 000
1877	January to January, inclusive	13 of 3	14, 040, 000
1878	February to June, inclusive	5 of 2	7, 020, 000
1878	July, August, and December	3 of 1	
1879	January	1 of 1	1, 620, 000
1879	May, June, August, and December	4 of 50c.	
Total			31, 320, 000

ASSESSMENTS LEVIED.

Number.	Date.	Amount per share.	Total amount.
1	June 30, 1881	$0 30	$162, 000 00
2	January 18, 1882	20	108, 000 00
3	March 29, 1882	20	108, 000 00
4	June 10, 1882	10	54, 000 00
5	September 5, 1882	20	108, 000 00
6	November 21, 1882	20	108, 000 00
Total		1 20	648, 000 00

In June last, some prospecting on the croppings having shown streaks of ore yielding fair assays, a winze was sunk for the purpose of ascertaining its value. The result has been the extraction of 610$\frac{1910}{2000}$ tons of ore, yielding bullion to the value of $10,122.86, or $16.58 per ton, this yield being 74 per cent. of the assay value of the ore; no allowance being made for moisture. Work on the croppings was discontinued in December, and will be resumed as soon as the weather permits.

The other work has been confined to opening out and partially prospecting the 2,500 and 2,700-foot levels, in the accomplishment of which there have been hoisted from the mine 11,319 tons of waste rock.

The following is the financial statement for the last year:

RECEIPTS.

Cash on hand at Virginia, last annual statement	$542 70
Cash on hand at San Francisco, last annual statement	631 92
Samples on hand at Virginia and San Francisco, last annual statement	14 36
Gross product of mine for 1882	10, 136 28
Assessment No. 2, 20 cents per share	108, 000 00
Assessment No. 3, 20 cents per share	108, 000 00
Assessment No. 4, 10 cents per share	54, 000 00
Assessment No. 5, 20 cents per share	108, 000 00
Amount received to date, on account of assessment No. 6, 20 cents per share.	46, 100 00
	435, 425 26

DISBURSEMENTS.

Overdraft at Nevada Bank, last annual statement (since paid)	$74, 630 25
Salaries and wages	59, 554 81
"C. and C." joint shaft	98, 200 00
Legal expenses, including tax penalties at Virginia	55, 072 53
Reduction of ore	5, 498 59
Miscellaneous supplies	1, 909 33
Hoisting	2, 232 00
Compressed air	9, 606 50
Sutro tunnel (royalty)	189 83

Suction fan	$7,450 70
Assaying	546 90
Team account at Virginia	110 25
Taxes	114 33
Virginia office expenses	229 63
Interest and exchange	3,541 39
Advertising and printing	3,873 85
Discount on bullion	493 47
San Francisco office expenses	3,554 92
Books and stationery	393 40
Hauling at Virginia	122 63
Water and ice	2,025 00
Timber	379 10
Powder, caps, and fuse	1,718 80
Candles	478 13
Oil	103 37
Hardware and fittings	704 16
Company's stock (being assessments, advertising, and auction fees on 131,511 shares of stock bought in by the company for non-payment of assessments)	77,513 99
Nevada Bank (money on deposit)	21,523 05
Cash in office, San Francisco	527 30
Cash in office, Virginia	622 20
Bullion on hand	2,477 07
Samples on hand and in Virginia	27 78
	435,425 26

At the Gould & Curry mine 200 feet were added to the depth of the Gould & Curry and Best & Belcher shaft, making a total depth of 2,565 feet. On the 2,300-foot level a drift was run (in conjunction with the Best & Belcher Company) a total distance of 907 feet without discovering anything of value at any point.

On the 2,500-foot level a drift was run southwest 690 feet, and from the end of the drift a cross-cut was started for the west wall 600 feet distant. It is running in an interesting formation and will open a large block of new ground.

The secretary's report shows the following:

RECEIPTS.

From assessments:	
No. 41, 50 cents per share	$54,000 00
No. 42, 50 cents per share	54,000 00
No. 43, 50 cents per share	54,000 00
Mine account—sale of sundry supplies	29,354 14
Total	191,354 14

DISBURSEMENTS.

Cash indebtedness as per statement December 19, 1882	13,631 40
Mine sundry supplies	6,239 85
Wood	24,796 10
Labor and salaries	12,566 25
Joint shaft, Gould & Curry and Best & Belcher	108,283 93
Office expenses, Virginia	204 33
Advertising	765 25
Stationery and printing	154 04
General and office expenses, San Francisco	1,862 70
Exchange	590 25
Interest	412 83
Taxes	1,407 42
Legal expenses	1,325 00
Total	172,239 35
Balance, cash on hand, Virginia and San Francisco	19,114 79
	191,354 14

Of the Gold Hill group of mines, Mr. Thomas G. Taylor, superintendent of the Yellow Jacket mine, informs me that this group, including the Exchequer, Alpha, Imperial Consolidated, Yellow Jacket, Kentuck, Crown Point, Belcher, Overman, Segregated Belcher, and Caledonia, are all flooded, there being 1,156 feet of water on the 3,000-foot level station. The water did not increase any during the last month of the year.

This great flow of water was cut by the Exchequer mine on February 13, 1882. The Yellow Jacket Company pumped and bailed an average of 110 inches per day for seven days, or 1,320 gallons per minute, but the water still gained against this quantity raised and flooded the mine to the 2,700-foot level—the level on which the water was cut, or the 2,800-foot level of the Exchequer. The pumps were run until the 28th of March, at which time the water stood 950 feet on the 3,000-foot level station, having filled all the drifts, winzes, shafts, &c., in all the mines from the Bullion on the north to the Caledonia on the south. The temperature of the water was about 160° F. As no combined arrangement could be made with the several companies to drain these mines, all work below the Sutro tunnel level was stopped, and has not been resumed since the flow of water was cut.

At the Yellow Jacket mine work was commenced in April to open the old stopes through the Winters shaft, and was carried on in the levels above the 1,000-foot level. From that time to the close of the year 4,492 tons of ore were extracted, which produced $87,923, or an average yield of $19.57 per ton.

The Kentuck mine, south of the Yellow Jacket, discovered a fine body of ore on their 250-foot level, which is making a considerable production. The mine is leased to Mr. C. C. Stevenson.

The Belcher and Crown Point mines are also yielding ore from the levels above the 1,700-foot level; they are both worked under lease.

The Overman mine is idle.

The Alta is running a drift on the level of the Sutro tunnel to connect with the same for the purpose of pumping their water to that level and discharging it into the tunnel.

The work at the Forman shaft has stopped. This shaft is a joint shaft of the Crown Point, Belcher, Overman, Segregated Belcher, and Caledonia mines, and was intended to cut the Comstock lode at a depth of about 4,000 feet. It has been sunk to a depth of 2,200 feet.

At the lower end of the American Flat a tunnel is being run to cut the ledge of the Delaware mine. Mr. J. C. Corey, the superintendent, states that this mine is situated on the high ground immediately west of American Flat; the title is a Government patent for 1,200 feet along the lode. Some four years ago a shaft was sunk to a depth of nearly 400 feet; drifts were run, and a well-defined syenite foot or west wall was exposed. A drift east 330 feet exposed a well-defined ledge of low-grade ore 36 feet in width, but a flood of water compelled a suspension of work for a time. About a year ago work was commenced on a tunnel which will be about 2,400 feet long when it reaches the ledge, and will strike it 600 feet below the bottom of the shaft or 1,000 feet below the croppings. The tunnel is now in over 2,000 feet and will reach the ledge early in 1883.

The production of Storey County, including the amounts obtained from the Lyon County tailings mills, was $920,000 in gold and $860,000 in silver.

WHITE PINE COUNTY.

In *Cherry Creek district*, in the northern part of the county, the Star is the chief mine. It continued steadily at work during the year and made a large production of bullion. Mr. L. M. Foulke reports the condition of the underground work at the close of the year as follows: Depth of the main shaft, 625 feet; length of main tunnel on 360-foot level, 2,000 feet; estimated length of drifts on the 160-foot level, 900 feet; on the 200-foot level, 600 feet; on the 360-foot level, 800 feet; on the 460-foot level, 2,000 feet; on the 540-foot level, 1,500 feet; and on the 625-foot level, 800 feet; making an aggregate length of tunnel and drifts of 8,600 linear feet. In addition to this there is a cross-cut from the shaft on the different levels to the ledges averaging 25 feet on each level; also various other cross-cuts, &c., amounting to 2,500 feet.

The following, extracted from the secretary's report, shows the financial condition of the company:

RECEIPTS.

Cash balance	$7,523 75
Received account of assessments No. 7 to 11, inclusive	44,531 00
Bullion (gross product)	313,445 94
Reclamation on freight	158 70
Total	383,352 97

LIABILITIES.

Interest on mortgage	$1,239 05	
Superintendent's drafts	3,024 90	
Cash at mine	3 20	
Overdraft Wells, Fargo & Co.	13,426 43	
		17,693 58
Total		383,352 97

DISBURSEMENTS.

Mine expenses	$196,083 05
Mill expenses	97,358 36
Material and supplies	12,447 53
Discount on bullion	51,804 53
Commission on bullion	661 58
Freight on bullion	5,453 85
Purchase of Dayton mill	4,404 68
Assessment on company's stock	628 76
Interest	1,650 19
Salaries	8,550 91
Bills payable	1,840 00
Sundry expenses	896 59
Superintendent (outstanding draft)	990 98
Cash in hands of superintendent and secretary	581 95
Total	383,352 97

Summary of financial condition of company.

LIABILITIES.

Old overlying indebtedness		$36,839 84
Overdraft, Wells, Fargo & Co		13,426 43
Outstanding drafts		3,039 90
Owing to mine		17,526 47
Estimate for supplies		4,000 00
Owing in San Francisco		1,000 00
Total		75,832 64
ASSETS.		
Cash	$648 00	
Bullion	2,650 00	
		3,298 00
Total		72,534 64
Value of property at mine and mill, as per inventory		82,594 61

From the above it appears that, although the gross product of the mine was $313,446, it was found necessary that the stockholders should be assessed to the amount of $44,531.

There are no other large bullion producers in the district. Many mines which at one time paid handsomely are now idle or only operated in a desultory way.

The Exchange mine, formerly known as the Exchequer, has not been in operation for four years. During the last four months of 1882 a few men were at work and extracted 282 tons of ore. The mine is opened by a shaft 240 feet deep, and three tunnels of 750, 200, and 175 feet, respectively, in length. In addition to this there are from 400 to 500 feet of drifts and cross-cuts.

In *Ward district* the principal mine is the Martin White. The work of the year was chiefly developmental and exploiting new ground. A large amount of ore was exposed, some of which was broken down and stored in the mine. The main tunnel is now 3,200 feet in length, and at various points drifts have been run, north and south, aggregating 2,125 feet. On the upper level there are about 2,000 feet of drifts, cross-cuts, &c. The shaft is 160 feet deep.

The following is the financial statement of the secretary of the company, presented at the last annual meeting of the stockholders:

RECEIPTS.

Balance on hand August 1, 1881		$6,504 91
Balance on account of assessment No. 10	$8,056 87	
Balance on account of assessment No. 11	14,870 38	
Balance on account of assessment No. 12	24,785 00	
		47,712 25
Quicksilver, salt, old material, &c		4,750 44
Real estate, rent of		160 96
Timber and lumber		3,485 56
Draft account—superintendent's drafts outstanding		6,987 47
Cash overdraft July 31, 1882		7,539 90
Total		77,141 49

DISBURSEMENTS.

Liabilities August 1, 1881	$2,383 28
Mine cost account of patents	191 70
Legal expense	100 00
Taxes	1,827 36
Interest	453 09
Assessment work	158 00
Mining expense	57,223 60
General expense	9,253 72
Office expense	4,413 26
Storehouse account	770 98
Wood	365 50
Total	77,141 49

LIABILITIES.

Superintendent's drafts outstanding	$6,987 47
Cash overdraft	7,539 90
Total	14,527 37
Sundry supplies on hand at the mine	20,975 26

In *Taylor district*, east of Ward, the principal mine is the Monitor, owned by Briggs, Lyons & McGill. It is reported to be one of the best paying mines in the county. The ore is of good grade, and can be taken out at but little expense. The mine is opened by two shafts of 90 and 125 feet depths, respectively, and drifts aggregating about 300 feet have been run. The owners contemplate putting on a large force of men, and pushing work vigorously.

In *White Pine district*, west of Ward, there are three distinct mineral-bearing zones running north and south: Treasure Hill as one; Base Range, Baylone Hill, Blue Hill, and Button Hill as another; and White Pine Mountain as the third. All three show different kinds of ore and country rock.

The Original Hidden Treasure is the oldest location on Treasure Hill. It was first discovered by an Indian boy, who packed some of the ore to Newark district in the fall of 1867. It was located, sold, and incorporated in San Francisco. The mine has yielded about $1,500,000. It has never been worked to a depth to exceed 200 feet from the surface. The ore thus far worked was from the main ore channel only. There is a tunnel started to cut the Original Hidden Treasure, known as the Wheeler tunnel. This tunnel will open the mine at a depth of 500 feet. The tunnel is located on the east slope of Treasure Hill, running west, and is now in about 480 feet.

The Stafford (known in the early days as the Hearst & Seymour) was explored with an incline. It was driven to a depth of 70 to 80 feet in ore of too low grade, and the ground was abandoned and relocated in 1875 as the Stafford on the south end, and the Haggin & Tevis on the north end, both claiming the same ground. A compromise was agreed on, giving the Stafford 640 feet south and the Haggin & Tevis 760 feet north. It has never been worked to exceed 60 feet in depth.

The Truckee, now the Irene, has yielded about $90,000, yet all its workings will not exceed 30 feet in depth. It promises to be another bullion producer, showing a bold outcrop, from 40 to 60 feet in width, the ore from which shows assays from $25 to $800 a ton.

In the Eberhardt tunnel work was continued with promising indications, and in December it was reported that an ore-body 1,700 feet below the surface had been encountered which is 4 feet wide, and the ore assays from $80 to $600 per ton, probably averaging $150.

Bald Mountain district is in the southwestern part of the county, on the east side of Newark Valley. Mineral was known to exist here, but it was chiefly copper, but recently ledges carrying gold and silver were discovered at the base of North Bald Mountain. The formation is granite and lime, the latter prevailing. The principal locations are the Black Hawk, Fulton, and Bonanza. None of them have as yet been developed to any great extent. The ore is rich in both gold and silver.

In the Newark Range of mountains is the Bay State mine, near the Eureka County line. It embraces four locations, the Chihuahua, Lincoln, Flagstaff, and Bay State, containing in all 6,000 feet by 200 feet in width. The mine is equipped with good hoisting works, ore sheds, boarding-house, blacksmith shop, &c. The Lincoln and Flagstaff locations are made on a fissure vein of quartz that crops out boldly on the surface on the north side of the cañon. There is a tunnel run in on the vein 317 feet, and at the end a winze is being sunk to connect with the main workings, from which a drift is being run on ore averaging $128. From the tunnel level considerable work has been done in upraising and stoping on the vein, which is from 2 to 5 feet thick, the ore running from $60 and less up to $1,800 per ton, selected. The main workings of the mine are on the south side of the cañon, and consist of a double-compartment shaft down 400 feet, drifts, and crosscuts. The principal ore-bodies thus far have been found on and above the 200-foot level. The highest workings from the main shaft are 80 feet below the level of the hoisting works. Upraising on ore will be continued until connection is made with the upper stopes, at present worked from several openings on the surface in the mountain side, the highest being 300 feet above the level of the hoisting works. As the ore is taken out of the mine it is assorted, the first class yielding from $200 to $300 per ton in silver; the second class from about $60 to $200, all of which is shipped to Eureka for treatment. All ore below $60 per ton is set aside to be treated at the company's mill. Of the latter, or third class, there are over 200 tons at present on the dump, which, owing to the fact that it cost $8 per ton during the summer and $10 in winter to transport it to Eureka, it will not pay to ship. There are at present about 24 men employed in the mine. It is probable, however, that this force can be increased to 150 men as soon as the $60 ore can be reduced at a profit.

The company's mill is being overhauled and placed in repair for the purpose of working some tailings that for years past have been undergoing desulphurizing in open air. It is estimated that there are from 800 to 1,000 tons that have been worked up to 35 per cent., which may now be worked up to at least 90 per cent. A test is also being made on raw ores, and, if successful, the mill can be kept running in the future on third-class ore. If, however, the ores cannot be worked raw, a chloridizing furnace will probably be erected. Adjoining the mill is a 10-ton blast furnace; but the Bay State ores cannot be easily smelted alone, on account of the scarcity of iron. The mill is equipped with twenty stamps, eight pans, five settlers, one clean-up pan, one agitator, two retorts, and one melting furnace. The engine is of 100 horse-power.

Osceola district is in the eastern part of the county, near the border line of Utah. Rich placer mines were located here, which are reported to promise large returns.

White Pine County produced in 1882 $40,000 in gold and $460,000 in silver.

CHAPTER III.

OREGON.

It has been difficult to obtain reliable information as to the amount of gold and silver annually produced from the mines in Oregon, for much of the mining has been done by the Chinese, who are reticent as to their operations, and much of the dust obtained from placer mining in this State is sent by private mail or carried to San Francisco or sent out of the country by the miner himself.

In the year 1882, of gold reported to have been received from Oregon, $140,000 less was deposited at the mint in San Francisco than in 1881. This would indicate a decline in the production of this State of at least $220,000. I have estimated the total amount for 1882 at $865,000, and produced as follows:

Counties.	Gold.	Silver.	Total.
Baker	$190, 000	$5, 000	$195, 000
Benton	5, 000	....	5, 000
Coos	5, 000	....	5, 000
Curry	20, 000	200	20, 200
Grant	240, 000	25, 000	265, 000
Jackson	135, 000	2, 000	137, 000
Josephine	175, 000	2, 000	177, 000
Union	60, 000	800	60, 800
Total	830, 000	35, 000	865, 000

BAKER COUNTY.

In that portion of Baker County through which flow Burnt and Powder Rivers and their tributaries, mining has thus far been confined to the precious metals, although minerals containing other metals abound. Placer gold mining, one of the principal industries of the county for more than twenty years, still gives employment to a large per cent. of the population, but is gradually being relinquished to the Chinese, who seem peculiarly fitted for that work and ready to pay a round price for ground already worked over by white men so long as the yield of gold will pay them fair wages. They are able to make abandoned mines pay, not because they are better miners than white men, but for the reason that they live more cheaply, and are satisfied with smaller returns for their labor.

Baker City is about the center of the mining section, nearly all the mines of the county being within a radius of 40 miles of that place.

The production of gold in Baker County for 1882 is somewhat reduced from the amount estimated for 1881. The Connor Creek mill was idle for a portion of the year, but the loss, Mr. J. Myrick states, was made up by an increased yield of the Gold Ridge mill. The season of 1882 was unusually unfavorable for placer mining in Baker County, but the greater number of mines worked has fully compensated for the diminished production this would have occasioned.

I am under obligations to Messrs. Ransom Beers, J. S. Locke, J. Myrick, A. J. Weatherby, and Samuel Colt, of Baker County, for valuable information embodied in the following detailed description of the mines of the county.

The Rye Valley Placer Company, of Concord, N. H., in the early part of the year purchased of Powers & Co., of Rye Valley, for $40,000, a valuable piece of mining property, consisting of about 40 acres of ground, with ditches, water rights, &c., and have been working it the past season with very satisfactory results, the yield having amounted to nearly half of the purchase price of the property. These mines have been worked for a number of years, and always at a handsome profit to the owners. Mr. Locke estimates that the mines of the Rye Valley Placer Mining Company produced 1,344 ounces of gold in 1882.

Of the Connor Creek Mining and Milling Company its superintendent, Mr. James P. Taull, says: "It is the largest in the State, having been actively producing bullion during the past ten years. The crushing power consists of one 20-stamp mill, driven by a hurdy-gurdy wheel using 45 inches of water under a pressure of 360 feet. The mine is opened by tunnels running into the mountain, and has over 4,000 feet of tunnel now open, showing over 250,000 tons of quartz now in sight and more being developed every day. The ledge is from 2 to 30 feet wide, and averages from $8 to $12 per ton in value.

"The placer mines of this district have produced during the year about $8,000—all by Chinamen; the quartz mines about $26,000, the mill running only three months during the year."

The Deer Creek mines, about 20 miles west of Baker City, have been worked in a small way for several years, but the various interests have recently been purchased by Mr. Karns, of Baker City, who controls all the water available for mining for a distance of 8 or 10 miles, and who will open up these mines next season on a large scale, unless a sale of the property should be made, for which negotiations with a Chicago company are pending.

In *Pocahontas district*, 8 miles from Baker City, the few mines that are being worked are still paying well, and a large extent of good ground remains undisturbed, as it cannot be worked without injury to the farms in the valley below.

Auburn, 12 miles from Baker City, was once the most flourishing mining town in the State, and her mines were the first discovered in the county; they have yielded millions of dollars, but all the bars and gulches have been pretty thoroughly worked out, though a few miners are still making a good living there.

Perhaps the most extensive placer mining in the county is in *El Dorado district*, 40 miles southwest of Baker City. The water supply is from Burnt River, through a ditch 90 miles in length. The mining season being short, and the keeping of so long a ditch in repair being very expensive, the owners are compelled to charge a high rate for water, so that only the best paying mines are worked with much profit.

The mines on Chicken Creek, according to Messrs. Beers and Weatherby, paid well during the season. Four placer mines yielded $10,000, and gold was obtained from quartz veins and crushed by McCord & Company's arrastra to the value of $2,000; the total production of the district is estimated at from $12,000 to $15,000.

Of the quartz mines in the county, or in fact the State, the Connor Creek mine will compare favorably with any on the coast. This property, owned by S. G. Reed and others, is about 3 miles from Snake River, on the creek from which it derives its name. The vein is from 3 to 12 feet wide, averaging about 5 feet, and is worked through tunnels that tap the ledge at different depths, so that no pumping or hoisting is required. The lower tunnel and the one above it (called the No. 4) are the only ones through which the ore is now taken from the mine, and each of them is in more than 1,000 feet on the vein. They are about 175 feet apart, and none of the ground between them has been stoped. A raise carried from the lower tunnel to No. 4 passed through a fine body of ore. Above the No. 4 the ledge has been stoped for about 500 feet from the mouth, but beyond this it is all virgin ground to the surface, a distance varying from 300 to 500 feet. It is estimated that there are not less than 100,000 tons of ore in sight above the level of the lower tunnel, and though a great portion of it is low grade, yet it will all pay a profit, as the facilities for working are such that, even with the old, worn-out 20-stamp mill now used for crushing the rock, the whole expense of mining and milling will not reach $3 per ton. But there is a large amount of rock in the mine that will pay from $10 to $20 per ton, and the whole vein will average $7 per ton. The company owns the water-power, which is ample for 40 stamps, and at a small expense can be increased sufficiently to run 60 stamps. A mill of the latter capacity will probably be erected next year, when the expense of working the ore will be reduced to not more than $2.50 per ton, and the mine ought then to yield a sure and satisfactory net profit.

In August, 1881, the mill was found to be so much out of repair that further expense upon it was not deemed expedient, and it was closed down. Work in the mine, however, was not suspended; the drifts on the vein have been driven ahead constantly ever since. It was understood that the company would put up a large mill this year, but for reasons probably better known to themselves than to outsiders it was not built, and the quartz that had necessarily to be taken from the mine as the work progressed accumulated to such an amount that, in September of this year, the old mill had to be started up to get it out of the way.

The mine up to the present time has produced about $400,000, and all from what might properly be called prospect work, for it was only fairly opened when the mill closed down in August, 1881.

The Gold Ridge mine, about 4 miles from Burnt River, owned by J. C. Ainsworth and others, is next in importance to the Connor Creek, and consists of a group of five or six ledges running parallel with each other through the ridge at distances of from 100 to 150 feet. Their course is nearly north and south, dipping to the west. A granite dike about 300 yards in width, between two belts of slate, contains all the ledges of the group, only two of which have been worked. These average from 25 to 30 inches in width, and yield about $12 per ton. They are worked through a tunnel which has been run from the eastern side, and which will be extended till all the veins are reached. The gold is exceedingly fine, and the ore is of a very uniform grade, and free milling, though no doubt the yield could be materially increased by a closer process of working, as the sulphurets are quite rich. The rock also contains bismuth in such quantities as perhaps to prevent perfect amalgamation.

The original owners of the mine hauled their rock, of which they worked about 2,000 tons, 4 miles to the Cape Horn mill of five stamps, situated on Burnt River, and run by water-power obtained from that stream. The average yield of the ore was $10 per ton. The mill is a rather primitive affair, and saves only the gold that will amalgamate very readily. The present company, after purchasing the property, abandoned the water mill and erected at the mine a 10-stamp steam-power mill, with all the modern improvements and a crushing capacity of 20 tons in 24 hours. The ore is taken in cars from the chutes in the mine direct to the mill and dumped on a "grizzly," through which the finer portion of the quartz passes to the ore bin, the coarser portion reaching the same place after passing through a Dodge rock-breaker. From there it passes through self-feeders into the mortars. The pulp passes over long sluices of amalgamated and silver-plated copper plates, thence over blankets. The blanket concentrations are worked in an amalgamating barrel, by which process they yield an average of one dollar for each ton of ore crushed. After passing from the barrel they are run into a reservoir, where they are saved for future manipulation.

The mill was completed in October, 1881, and run in daytime only for the first twelve months, but in November of this year, the mine being well opened by tunnels and drifts, it commenced running night and day, and it is estimated that there is enough rock above the level of the lowest tunnel for ten years.

The Gold Ridge Milling and Mining Company erected during the year a new 10-stamp mill, and have reasonable expectations of fair profits with proper management. They stamped out 2,162 ounces of gold in 1882, valued at $39,000.

The Virtue mine, 8 miles east of Baker City, formerly known as the Rockfellow ledge, has been idle for the last two years, but work on it will be resumed next spring, and a drift run from the new perpendicular shaft to tap the vein below any of the old works.

The Tom Paine mine, in Pocahontas district, was bonded last year to an Eastern company, and no work of any considerable amount has been done on it since.

The Young America, near the Tom Paine, is a very promising mine. The croppings show some excellent ore, and a shaft about 50 feet in depth shows a fine ledge all the way. The property is owned by Mr. S. Ottenheimer, a prominent capitalist of Baker City and one of her principal merchants. His other business has demanded so much of his time heretofore that he has paid but little attention to his mining interests, but he intends to commence operations on this mine next spring, and the enterprise that he has shown in other branches gives an assurance that the work will be prosecuted with an energy that will soon place the Young America among the prominent mines of the county.

The Bay Horse mine, on the west bank of Snake River, owned by Huntingdon & Co., is very rich in silver, assaying from 100 to 600 ounces to the ton. There are no regularly defined walls near the surface, but no doubt they will be found at a greater depth. A half interest in the mine was sold recently for $6,000.

The New England and Oregon Company have done no work with their mill nor in their mine the past year.

Gold Mountain, on the north side of Burnt River, contains almost innumerable small veins of quartz, which on the north and east sides of the mountain are gold-bearing, while on the south side they are rich in silver. None of them have been worked to any extent. Wood & Easterbrook have crushed some of the gold rock in a small 5-stamp mill on Burnt River, but not with very encouraging success.

The Mammoth mine, 30 miles west of Baker City, is a large vein, 20 feet wide, but the greater portion of it low grade. A small 5-stamp mill at the mine has worked some of the ore, but a larger one is required to place the property on a paying basis. It is reported that a California company has recently bought the mine.

The mining district of *Humboldt Basin*, sometimes known as Mormon Basin, is on the top of a mountain ridge running nearly east and west, on the sides and at the foot of which are located the Clarksville, Rye Valley, Amelia, Malheur, and El Dorado mines. The district is described by Mr. Samuel Colt as being about 9 miles in circuit, and formed by a depression or broadening of the mountain. He says:

"Outside of the rim of this basin the mountain recedes to a lower altitude than the mines have, hence no water from neighboring streams can be introduced into the mines, with the exception of that from two small ravines having their rise in a granite peak just outside of the basin and introduced through a depression in its rim. With the exception of this water the mines are entirely dependent on the snow, which, melting in the spring, gives, during the best seasons, about eighty full days of water to the mines, and during poor seasons not more than twenty. The geological formation of the mountain range is granite, superimposed in places by slate, greenstone, porphyry, and quartz. The basin evidently at some former period was a lake, and the placers are now resting on the *débris* which washed down from the mountain sides and filled the bottom to an unknown depth. In this *débris*, 20 feet beneath the gravel worked off, drift-wood has been found. Volcanic ashes are also found beneath the surface of the soil, doubtless deposited by an extinct crater several miles distant. The mines were discovered and worked in 1863, at that time giving employment to over 100 men. With the rude appliances then used it was not uncommon for three men to make for a week's work $1,000.

"The mines are now worked by only three companies—that of Littig & Co., Lum Sing (a Chinese company), and that of S. & H. Colt.

"The mine of Littig & Co. is worked by 3 white men and 3 Chinamen through 16-inch sluices, having a grade of 10 inches to 12 feet. They use hydraulic hose under a pressure of 75 feet; water forced through a two-inch nozzle. The gravel worked is from 12 to 20 feet in depth. The reported average yield is $6,000 for the season of three months.

"The Lum Sing Company's mine is worked by 20 Chinamen through 16-inch sluices, using hydraulic hose, under 60 feet pressure and a 2-inch nozzle. The bank of gravel worked is from 12 to 15 feet in depth, and the reported average yearly yield is $20,000." The company, according to Mr. Ransom Beers, in 1882, with two hydraulics cleaned up $14,456. The property, which consists of heavy bar claims, cost $29,000, and pays from the top to bed-rock.

"The mine of Colt Brothers," Mr. Colt says, "is worked by 5 white men and from 15 to 25 Chinamen, according to the season. They use two sets of 16-inch sluices, emptying into a 30-inch flume 2,000 feet long. Their mine is worked by hydraulic pressure, using 7-inch iron pipe and two of Craig & Hoskin's patent monitors, having 2-inch nozzles, worked under a pressure of 100 and 175 feet. The bank of gravel is from 5 to 20 feet in depth. The yield of the mine is from $8,000 in poor seasons of water to $20,000 with a more abundant supply, during the extreme limit of eighty days.

"The mining of the past twenty years has exhausted about one-third of the placer deposits known to exist in the district, and it is reasonable ot suppose that with the present water supply and running appliances used the remaining mines cannot be worked out in much less time than a century. At this time there are no quartz lodes sufficiently developed to demonstrate their value. No other district in the county has furnished so many valuable quartz specimens as this. The Colt Brothers have extracted $3,000 in gold from the quartz specimens found on their claims in a single season. In no other district are found more quartz bowlders than in this. Many of them will weigh a ton each, and not a few of them have gold visible on their surface. No doubt when more extensive explorations are made the lodes will be found."

The Hap Wah Company, also using two hydraulics, cleaned up only $11,000, owing to scarcity of water.

The Gin Ye Company is said to have taken out $5,623, in 1882, with one hydraulic.

Quite a number of Chinamen and some white men are mining on a smaller scale, working mostly with rockers, and it is believed that they have taken out at least $4,000.

The mining season in this camp is short, the best seasons not averaging over four or five months in the year, the miners having to depend entirely upon rain and snow for the necessary water supply; that of 1882 was the poorest in several years.

Most of the gold dust taken from here by Chinamen is sent to China by private conveyance. On the larger claims there are from eight to seventeen men in a company, and every fall some from each company go home to visit their friends, returning the next spring. The miners send by them all the gold dust they have taken out during the preceding season except an amount sufficient to pay their actual expenses. The poorer ones, if they have but half an ounce of dust, send it. In this way many thousands of dollars are sent out of the country of which no account is taken. Chinamen say they get nearly two dollars more per ounce for their gold in China than they can obtain for it in this country.

Of the stamp mills mentioned in my last report—to which should be added the Cape Horn, of 5 stamps—only the Connor Creek and Gold Ridge have done any work of importance during the past year.

I have estimated the production of Baker County during the calendar year to have been $190,000 gold and $5,000 silver.

BENTON COUNTY.

But one report has been received from this county. Mr. J. L. George writes of the *Alsea mining district* that the gold beach has been covered up by white sand. He places the yield of the district for the year at $4,850.

COOS COUNTY.

Mr. J. H. Nosler, of Coquille City, who has furnished the principal information in regard to Coos County mines, estimates their annual yield at $20,000.

The principal placer mines of this county, called the Johnson mines, are on the South Fork of the Coquille River. These mines have been worked from their discovery by Johnson in 1853 up to the present time, and for the last few years principally by Chinamen; the amount of gold extracted yearly is supposed to have been about $5,000. Many mining experts believe the principal ledge has never been found, for the reason that many years ago a man by the name of Dunbar extracted from one small bowlder that rolled from the mountain $1,500.

The most extensive mining for gold along the coast on the western border is termed "beach mining." The mines are rich, but the gold is very fine, so that in sluicing not one third of the assay value can be saved.

The Randolph mine, near the mouth of the Coquille River, and about 2 miles back from the ocean, is the principal beach mine. A mining town, Randolph, which sprung up here in 1855 and contained about 1,000 miners, dwindled down to a single inhabitant, Mr. Simon Lane, son of General Lane, and sole proprietor of the mines. Mr. Lane has improved his mines by running new tunnels and putting in new machinery, and took out $5,000 in 1882. The usual yearly yield of the Randolph mine has been $10,000.

The Siskiyou River mines (placer) are situated in the southern part of Coos and northern part of Curry Counties, and were continuously prospected and worked by some ten miners, who made in the last year only day wages in their operations.

CURRY COUNTY.

Mr. Frank A. Stewart, of Ellensburg, states that no silver mines have yet been opened in the county. The silver obtained is found in the "beach mines," and both silver and gold in particles more minute than the sands of the sea.

The following is his statement of the production of these beach mines during the year:

Locality.	Gold.	Silver.	Total.
Gold Beach	$1,500	$10	$1,510
Ophir Beach	8,000	50	8,030
Eucre Beach	3,000	20	3,020
Camp Blanco Beach	2,000	15	2,015
Miscellaneous mining on the beach	2,000	15	2,015
Miscellaneous mining on the Sixes River	1,500	....	1,500
Miscellaneous mining on Rogue River	500	....	500
Total	18,500	110	18,610

GRANT COUNTY.

Grant County, situated in Eastern Oregon, is east of Wasco and west of Baker Counties, and between Umatilla County on the north and the States of Nevada and California on the south.

Gold was discovered in the county in 1862 by a party of miners from Yreka, Cal., on their way to the then famous Salmon River mines in Idaho Territory. The principal placer mines were on the Canyon, Dixie, Elk, and Granite Creeks, the earliest worked and most productive being on Canyon Creek, on which, along the creek bottoms, about 150 miners and Chinamen were employed during the year—a much less number than formerly; for it is stated that at one time, although food and clothing were very high, and expenses were correspondingly increased, 5,000 men were at work on the creek and made profitable wages. Then it paid to work only the richest mines. The amount estimated to have been taken out of these placers during the year is $100,000. All of these creeks were successfully worked until about the year 1872, since which time less mining has been done on them, and the work is now carried on principally by the Chinese, who have bought and successfully worked claims abandoned by white men.

Prospecting for quartz was commenced about the year 1870, but, although a large amount of work has been done in quartz mining, the returns thus far have not been encouraging, owing principally to the lack of machinery necessary for this class of mining; the developments have, however, conclusively proved that in the mountains of Grant County vast bodies of quartz have been deposited which are rich in gold and silver. The principal quartz ledges are in the northern portion of the county, in the range of mountains between the Middle and North Forks of the John Day River, including *Elk* and *Granite Creek districts.* In the latter, although not actively worked during the past year, eighteen of these quartz mines have been operated at intervals and have produced some ore. Sixteen hydraulics have been in operation and 140 men employed in mining in Grant County, only 30 of whom were white men, the remainder Chinamen.

The greater amount of gold dust taken out of the various mining camps in Grant County is by white labor, and the mines are owned by white men, with the exception of those mines now being worked on Canyon Creek and on the John Day River below its mouth. About two-thirds of all the gold taken out in the year 1882 from these mines was obtained by Chinese labor.

In *Elk Creek district* the most noted mines are the Gem of the Mountains, the National, and the Princess.

The Princess ledge will doubtless be developed in another year. So far as it has been tested, the ore, of which there is an abundant supply, averages about $60 per ton. The ledge is about 40 inches in width.

At Elk Creek 30 or 40 Chinamen have been engaged in placer mining, and 10 white men in quartz and placer mining.

This district contains many veins of gold-bearing quartz. From one mine 70 tons of ore were taken during the summer and ground in an arrastra. The gold sent out of the district during the year is estimated to have amounted to $15,000.

Granite Creek district is one of the largest districts in the county, and is rich in gold and silver bearing quartz lodes, the most noted of which are the Beagle and the Cabell. The principal producing mines of the district, except the Cabell, are placers, and are estimated by Mr. W. Johnson to have yielded 2,840 ounces of gold. Mr. M. J. Hellman, however, only places the value of the gold from Granite Creek at $20,000.

The Cabell mine, according to Mr. P. Metchan's statement, was successfully worked from 1875 to 1877, producing, with the aid of a 5-stamp mill, both gold and silver. The character of the quartz extracted in the latter year was almost entirely silver-bearing, for working which the machinery was insufficient, and, the owners being involved in difficulties, operations were suspended. "In 1881," he states, "the mine was relocated under the name of the 'Monumental,' and worked by one man, who, with the aid of an arrastra during a three-months water season, in 1882, had a yield of about $2,000 therefrom. The mine is being put in readiness for work by Messrs. Thurburn, Sloan & Co., its present owners, and good results are confidently expected from it in the future. The Monumental has now a 10-stamp mill and all modern improvements." It has produced about $70,000. The shaft is down 300 feet. The vein is small, but very rich in silver, the ore antimonial and ruby silver.

The Humboldt Mining Company kept two hydraulics at work on the west side of the creek in ground which had previously been partially worked, and from a clean-up realized $7,000. Considerable labor was expended in digging down to bed-rock. In Town Gulch another hydraulic was in operation, which took out $2,000, and further up the creek 6 white men, engaged in mining and prospecting, took out $1,000.

Gold-bearing quartz in large quantities and of an exceedingly rich quality has also been found in the Canyon Creek Mountains. Mr. Johnson mentions as the most prominent of the quartz locations the Ajax and the Belleview, which, he says, have been extensively prospected, and show ore of a high grade, assaying from $200 to $600 to the ton.

Dixie Creek.—Two hydraulics in operation on this creek during the year are estimated to have washed out $5,000, and near Prairie City 35 Chinamen are reported to have taken out $25,000. The quartz veins found further up the creek, near its head, are supposed to be the source of the gold found in the placers lower down. A small mill and three arrastras are at work crushing the quartz, ore from which has paid during the year over $20 to the ton, and sometimes as high as $76. The number of men engaged in quartz mining was reported to be only 16 on thirteen locations, from which they extracted $12,000.

Of the Gold King mine, situated on the left-hand fork of Dixie Creek, and discovered about the year 1880, Mr. Hellman writes: "The owners have been prospecting it steadily since that time, and have erected arrastras for the purpose of giving it a thorough test. During the year 1882 the ledge developed both in size and richness. The ledge has a width of nearly 2 feet, and the rock will average $50 per ton. It is mostly free gold, but is beginning to show up considerable silver, and so far has continued to grow in richness."

In the immediate vicinity of the Gold King are other ledges which prospect well, and no doubt they all will pay when milling facilities are provided.

The Black Prince is another mine which will probably be remunerative. This mine was discovered about the same time as the Gold King. It has been steadily prospected since its discovery. It is about 3 feet in width, and the ore so far as worked has averaged $45 per ton. The owner is fitting up a 5-stamp mill.

In the placer mines at *Marysville* the gold is found in a rolling bench at the foot of a mountain, and appears to come from ledges above. Five hydraulics were operated during the year and employed 10 or 12 men. The estimated production of Marysville was $13,000, including in that sum $3,000 for the production of Quartz Gulch and Pine Creek.

At *Olive Creek* 15 white men and 20 Chinamen were employed. Three hydraulics were at work, which took out about $5,000. The total amount obtained in this district is estimated at $13,000.

Mr. A. E. Starr, of Prairie City, reviewing the mines of Grant County, says:

"We have just commenced to grind rock; yet ledges bearing gold and silver have been known to exist in Prairie City district for years.

"The Buffalo quartz ledge has been worked for two years; the ore in sight carries arsenides to such an extent that chlorination works are needed to make it profitable.

"The last and best discoveries in Prairie City district are the quartz lodes known as the Keystone, Wide West, the Green Mountain, and the Orient, on the same lode. The lodes are well situated for working, as the gulches cut them at right angles, and thus afford excellent drainage."

The rock is free milling, and contains nothing to interfere with amalgamation. The lodes have a northerly and southerly trend, and dip to the east. They are about 4 feet wide, with well-defined walls. The ore contains also some little galena, and assays as high as $160 in silver per ton. The average yield by milling during the season was $53 per ton in gold; the silver was not recovered by amalgamation. Settlemier, Starr & Co., owners, run the tailings into a reservoir. Their mines are situated in a range of high hills, in a spur of the Blue Mountains, with plenty of timber and water.

Seven levels have been run on the Keystone, some to the depth of 100 feet, all showing good pay rock. The company have started a tunnel, which will cut the vein at 600 feet.

Laurance, Perry & Co. own on the same line of ledges. Although their location is higher on the mountain, the croppings yielded over $20 per ton. They will run a tunnel to tap their mine at a greater depth.

The Cougar quartz lode, opened this year, promises to be a paying mine. But little milling has been done, the rock yielding $20 per ton free gold.

Quartzburg district is situated 6 miles from Prairie City, in the Blue Mountains, 200 miles east of The Dalles. The quartz belt is about one mile wide, and quartz appears on the surface northerly and southerly 3 miles in length. Ten to fifteen lines of ledges, parallel with each other, have been located during the year. A majority of the quartz in this district assays high in silver; all the rock crushed from the different ledges for the purpose of prospecting paid over $20 per ton. Mr. Starr states that the mines are all quartz, and are reported to have yielded in 1882, $10,500.

Mr. J. E. Lasswell states the production of the *Rock Creek district* during the past season to have been $3,030.

On the western limits of this county are the placer mines of *Spanish Gulch*. Three hydraulics are reported to have been at work, employing 7 white men, and are reported to have obtained about $3,000.

The Grant County News publishes the following statement of the operations of mining during the year:

Number of men engaged in mining in Grant County during 1882.

Canyon Creek	165
Granite Creek	140
Dixie Creek	65
Olive Creek	35
Marysville	27
Elk Creek	40
Miscellaneous	25
Total	497

Number of quartz veins located and recorded in the office of the county clerk during 1882.

Gold and silver:	
Granite Creek district	27
Elk Creek	8
Olive Creek	8
Dixie Creek	33
Canyon Creek	1
Quinn River	6
Total	83
Placer:	
Granite	2
Olive	2
Elk	4
Canyon	5
Total	13

Yield of Grant County mines during the year 1882.

Canyon Creek	$110,000
Granite Creek	65,000
Dixie Creek	42,000
Olive Creek	13,000
Elk Creek	15,000
Marysville	13,000
Spanish Gulch	3,000
Miscellaneous	10,000
Total	271,000

It is difficult to place any correct estimate upon the yield of gold from placer mines during the year 1882, as the greater portion of it is extracted by Chinamen. From the best information he has been able to gather, Mr. Metchan estimates the yield for 1882 as follows:

Canyon Creek	$100,000
Marysville	25,000
Dixie Creek	50,000
Olive Creek	20,000
Granite Creek	60,000
Elk Creek	30,000
Spanish Gulch	15,000
Total	300,000

Detailed information received leads me to believe that these estimates are above the actual production of the county, which I have placed at $240,000 gold.

The value of the gold extracted from the *Olive Creek* and *Granite Creek districts* is from $12 to $16 per ounce; from the other districts from $16 to $17.50 per ounce, being of a superior quality.

The following persons and companies, none of whom are Chinese, are engaged in placer mining in Grant County: The Humboldt Mining Company, on Canyon Creek; S. C. Hillis & Co., at Marysville, 1½ miles from Canyon City; M. V. Thompson & Co., of Marysville; William Hahn, of Quartz Gulch; Wolfinger & Co., of John Day; William B. Carpenter, of Olive Creek; Sam. Carpenter, of Olive Creek; O. P. Cresap, of Elk Creek; Daggett & Hiatt, of Olive Creek.

More prospecting for quartz has been done in this county during the year 1882 than during any previous year. Among the gold-bearing ledges are the following recent discoveries:

	Owned by—
The Wide West	A. E. Starr.
Green Horn	Nick Thornton.
Badger	A. A. Settlemier.
Buckeye	Geo. Shearer.
Magpie	Chas. Smith.
California	J. D. Sutherland.
Oregon Ledge	Canada & Daggett.
Mountain Side	J. B. Cabell.
Silver Crest	J. B. Cabell.
Bull Elk	John Laurance.
Orient	John Laurance.
Elizabeth	Thurbin & Sloan.
Standard	J. F. Weigman.
Esmeralda	E. Flaharty.
Hawk Eye	Will D. Baldwin.
Mountain Queen	Stevens & Hiatt.

There are many ledges, old discoveries, which were not fully developed until the year 1882.

JACKSON COUNTY.

No mineral ores are found in the eastern part of this county.

At Applegate Messrs. Berryman & Hansen have drifted a considerable distance in the bank of the stream and are reported to have taken out as high as $10 per day.

At Steamboat Messrs. Beck & Epperson, in working their hydraulic claim, have at times found nuggets and coarse gold.

At the same place Mr. R. Cook, in order to strike the ledge, has run a tunnel a distance of 212 feet.

The Ashland and Phœnix mines are reported by Messrs. A. D. Rockfellow & Co. to have produced during the year in the aggregate $2,500.

The production of *Grant's Pass mining district* has been placed by Mr. Dimmick, the postmaster there, at $2,800.

The returns from Jackson County are not complete; and as this would seem to have been an unprofitable year, I have estimated the production of the county for 1882 at $135,000.

JOSEPHINE COUNTY.

Mr. W. J. Wimer, of Waldo, states that the Waldo Hydraulic Mining Company own the leading mine. The gold is fine and evenly distributed in the deposit. They have 160 acres of ground, a vast deal of which is good. The depth of the bank is from 40 to 60 feet. They have 5 miles of ditch, affording an abundance of water nine months in the year. The cost of opening the mine was $8,000, and the cost of the ditch $10,000. The main ditch carries 1,500 inches of water. From 6 to 10 men are employed day and night. The yield during the year was $20,000. This claim was opened two years ago. The cut was commenced in 1877, but was not finished until 1880. Since then it has yielded $60.000.

The Scott's Gulch claim (Dessell & Connell), Mr. Wimer says, was opened in early days; cost of opening, $25,000. The length of the main ditch is 7 miles; size, 4 feet; length of small ditch, 11 miles; size, 3½ feet; length of pipe, 1,500 feet 11 inches and 1,500 feet 6 inches. They use a 7-inch giant and a Cranston elevator. They have 320 feet pressure, a 2,400-foot flume, 3 feet wide, and an 8-foot dump. They have 20 acres of ground.

Twenty-five cents per hour is paid in this camp for mine hands. Blocks are used in the flumes with Hungarian riffles. Gold is nearly all fine, requiring a good quantity of quicksilver. Employ from 6 to 25 men each year. The yield is not known. The claim was opened twenty-one years ago.

But little gold was obtained in the *Murphy mining district;* the yield is stated by Mr. Wimer, the postmaster, to have amounted to $2,000.

The principal mines in the *Illinois mining district* are those of Newman & Co., Peter Reiser, Horace Woodcock, and Haverland & McDaniels; the total production is estimated by Mr. De Lamatter at $24,900, $9,000 of which he estimates to have been produced by the Chinese.

Mr. John Hodgden, of Althouse, stated that 29 white men and 50 Chinamen have been engaged in mining in *Althouse district*, and estimates that the former have taken out $750 in gold, and the latter, $1,500. The mines are wholly placer. Another estimate makes the production of the Chinese companies $5,000, and of the district $11,500.

In the *Williamsburg district* the Horse Head, the principal mine, is estimated to have yielded $3,000.

In *Galice mining district* the Sugar Pine quartz mine yielded $1,740 and the Rogue River placer mine $2,700.

On Galice Creek, Green Bros. have taken out a considerable quantity of rich ore, but none has been crushed since July. The total production of the mines on the creek is estimated at $10,000.

The Josephine mine, located on Slate Creek, was sold at master's sale, at Kerbyville, in September, for $3,740.

Mr. A. De Smith estimates the production of *Kerby district* at about $25,000.

Several thousands of dollars are reported to have been taken out during the clean-up for the season from the Farris gulch mine.

The Portland Company have set a 15 stamp mill in position, preparatory to commencing work at an early day.

It is estimated that the Waldo Hydraulic Mining Company, the Scott's Gulch Mining Company, and Messrs. Bybee & Newman have taken out about $35,000 worth of gold.

Although the quartz mill of Messrs. De Lamatter & Co. has been temporarily closed, a large amount of ore of an excellent quality has been taken out for crushing in the future.

Mr. De Lamatter, of De Lamatter & Newman, owners of the Cow Flat mines, has purchased Peter Reiser's claim—a valuable mining property—some distance below Cow Flat, for $5,000. He will run a ditch from the other claims to this property.

The following estimate of the production of gold in Josephine County during the year 1882 is by Mr. F. M. Nickerson, the county clerk:

Waldo Hydraulic Mining Co	$16,000
Desselles & Co	4,000
Bybee & Newman	4,000
N. De Lamatter & Co	5,000
Green Bros	3,000
Althouse mining district, general mining	40,000
Waldo mining district, general mining	25,000
Canyon Creek and Josephine, general mining	40,000
Galice Creek, general mining	10,000
Williamsburg, general mining	20,000
Total	167,000

UMATILLA COUNTY.

No production of gold or silver is given for this county, as correspondents state that no mines were worked during the year. In former times some little placer mining was carried on, chiefly by Chinamen.

UNION COUNTY.

Mr. A. C. McClellan states that the only mining carried on in this county is in the eastern part, where gold, silver, copper, and galena are found. Four arrastras and one quartz mill are at work. In the Sparta Basin considerable gold has been taken from the placers.

Mr. L. B. Stearns gives the production of the Eagle Range of Union County for 1882 at $27,000. He states that a number of locations were made by the Walla Walla Company, but no developments have as yet been attempted. The mining season is short, lasting from about the middle of June to October. The valleys are well suited to agriculture, and the soil is highly productive.

A report received from Mr. Rufus Perkins, of Sparta, Union County, states the yield of the Hogan quartz and the Sparta placer mines in 1882; the former he reports to have produced 1,200 ounces of gold, worth $23,000, and the latter 2,200 ounces, valued at $35,000, making a total for the county of $58,000.

CHAPTER IV.

WASHINGTON TERRITORY.

No reports of production from individual mines were received from this Territory, and in estimating the production I have been obliged to rely mainly upon returns made by express companies of shipments of gold from the various localities.

Placer mining is the chief source of the yield, a large portion being the result of the work of Chinamen, on the Upper Columbia and its tributaries.

Of the quartz discoveries the Oregonian says:

"Some eight years ago placer mining commenced on the Swauk, and has continued with paying success ever since; but although a good deal of coarse gold has been found, remuneration for the same has been small for the amount of work done. The mining in that way is confined to two white men and eighteen Chinamen—in three gangs of the latter. About a year ago a hunt for quartz developed a rich deposit of gold-bearing quartz in what is now denominated the Homestake lode. The discovery naturally instituted search in neighboring districts, and since then other important discoveries have been made of equal value, if not greater; and now the opinion prevails to a large extent that rich deposits exist in the surrounding country.

"The discovery of the Homestake was made by Louis Queitsch and Henry Livingston, both men of experience in quartz mining. The latter is now engaged in running a tunnel on the Homestake. Livingston has had more or less experience in the mines of Colorado and Nevada, while Queitsch has been scouring the mountains in the vicinity of Nigger, Peshastin, and Ingals Creeks for the last four years.

"The lodes on the Swauk, with the exception of the Cordelia, run northeast and southwest. The Homestake and other parallel lodes are cut at nearly a right angle by the Cordelia.

"The Bonanza runs parallel with the Homestake, which is thought to be good enough to justify the erection of a mill thereon."

During 1882 $93,054 were carried by Wells, Fargo & Co., from Washington Territory by express, and Mr. Valentine, the general superintendent, estimates that half as much more was carried by private hands.

The amount by express showed an increase of nearly $26,000 over that carried in 1881, but the amount deposited at the San Francisco Mint was nearly $2,000 less than that in the preceding year.

I am inclined to think that a larger portion of the total yield was shipped by express than during the previous year, and that the estimate of Mr. Valentine that half as much more was carried by other conveyance is excessive. I therefore have estimated the production at the same amount as in 1881, viz, $120,000.

According to the shipments by express from the various localities in the Territory, this amount was obtained from the different counties approximately as follows:

Jefferson County	$10,000
Klikitat County	2,000
Spokane County	15,000
Walla Walla County	90,000
Whitman County	3,000
Total	120,000

CHAPTER V.

ALASKA.

On the Pacific coast new gold fields are being explored in Southern Alaska, but no definite information has been received as to character, extent, and production of the mines in that region.

A correspondent to a Western paper claims for Alaska the production of $200,000 in 1882, and Mr. Valentine has estimated $240,000.

The deposits of gold bullion at the San Francisco Mint during the year, credited to Alaska, were $34,011 in 1882, as against $13,375 in 1881.

Although these deposits for 1882 were nearly three times the amount credited in 1881—and private refineries probably received from the Territory more than the mint—I doubt that so large a product—nearly a quarter of a million of dollars—was obtained in 1882 from these newly-discovered mines. But Mr. Valentine's opportunities for information in regard to the bullion shipped by express are so favorable, and his conclusions entitled to so much weight, I have doubled the amount, $75,000, I should have credited to Alaska on the basis of its gold deposits at the mints, and placed its production at $150,000.

CHAPTER VI.

IDAHO.

The growth of the mining interests in Idaho Territory has been slow compared with that of surrounding States and Territories, and yet it has not been that the mineral wealth is less or that her people have lacked enterprise and perseverance. A variety of circumstances have combined to retard a proper development and prevent the Territory assuming a fitting place in the rank of gold and silver producing States and Territories.

As in the case of mining countries generally, the first mines discovered were placers, and the extraordinary richness of the surface deposits in Northern Idaho at Florence and Warrens, of Boise Basin in Boise County, and on the upper reaches of the Salmon River, brought numbers of miners and adventurers to the country. The rich placers were soon exhausted and attention was given to prospecting for quartz ledges, and a number of valuable mines were opened in Owyhee and Boise Counties Their prosperity did not long continue; from overcapitalization, mismanagement, unsuitable machinery for the reduction of rebellious ores, and the expense of procuring supplies, the greater number of mining ventures ended in disaster, and the mines were abandoned or tied up in litigation.

In Central and Northeastern Idaho but few discoveries of quartz mines had been made prior to 1877. Situated far from the ordinary lines of travel, only the most daring and hardy adventurers sought its mountain solitudes. The means of communication at best were by tedious journeys by stage or wagon routes, and the greater part of the country was accessible only for horses or pack animals over rough mountain trails, where natural obstacles to travel were enhanced by the recurring presence of prowling bands of Indians, who long resented the intrusion of the whites on their hunting grounds.

It was only after the Bannack war that the prospector could pursue his vocation without fear or molestation, and the stories of the few adventurers who had visited this region, which was represented on most maps of that day as "unexplored country," and the exhibition of specimens of ore so rich as to appear almost fabulous, stimulated the exploration of the country and the search for mineral ledges carrying the precious metals.

The result has been that during the last three years Eastern Idaho, from the Salmon River in the north to the lava beds on the south, has been teeming with prospectors and miners; thousands of locations have been made on the Salmon River, Yankee Fork, Sawtooth Range, and Lower Wood River.

Little Wood River and Little Lost River mines have been opened and worked, mills and smelting furnaces erected, and a stream of bullion has commenced to flow which is certain to increase as the resources of the country become better known and developed.

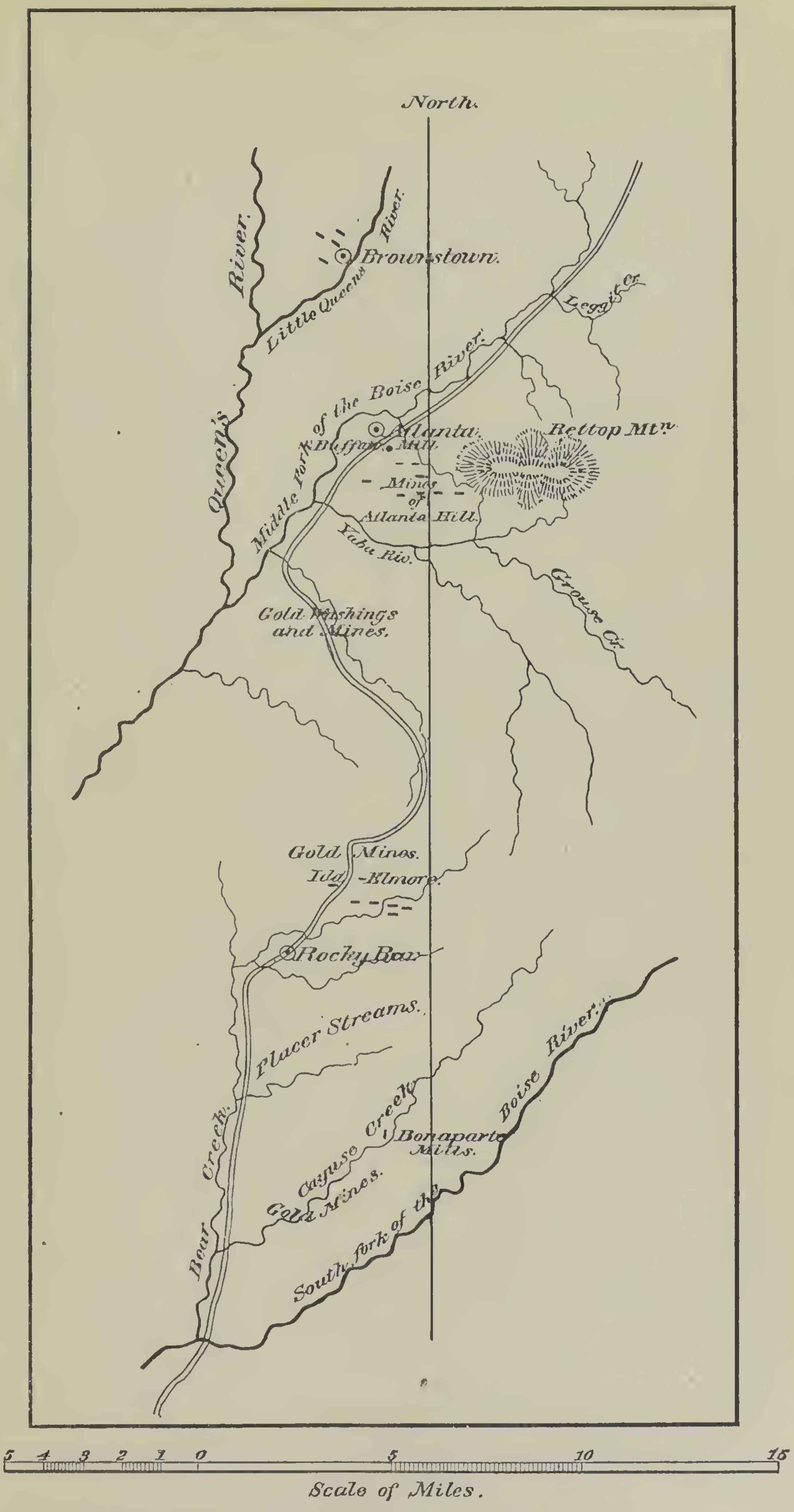
To-day Idaho stands on the threshold of a great advance. The Utah and Northern Railroad has opened the extreme eastern part of the Territory. The Oregon Short line, which leaves the Union Pacific at Granger, crosses the Utah and Northern at Pocatello, and is being pushed rapidly across the Territory from east to west. A branch road is in course of construction to Hailey, on Wood River, from which point lines will diverge to all the important mining camps lying to the east, west, and north, and not only afford cheaper and easier transportation for supplies, but furnish an outlet to market for immense amounts of ore now awaiting the advent of the road.

The current year will bring the mines of Idaho well to the front, not only those in the new mining fields of Alturas County, but the old mines of Owyhee and Boise Counties will be resuscitated, new and improved mills will be built, smelting and reduction works erected and the music of the dropping stamps will keep time with the onward march of the chief industry of the Territory, producing a steady stream of wealth to repay her enterprising and stubborn people who so long have struggled to overcome the many disadvantages attached to mining operations conducted so far from the base of supplies.

The total production of the Territory during 1882 was about $3,500,000, of which $1,500,000 was gold and $2,000,000 silver. The yield by counties was approximately as follows:

Counties.	Gold.	Silver.	Total.
Alturas	$175, 000	$770, 000	$945, 000
Boise	290, 000	20, 000	310, 000
Cassia	25, 000		25, 000
Custer	300, 000	950, 000	1, 250, 000
Idaho	240, 000		240, 000
Lemhi	180, 000	30, 000	210, 000
Nez Perces	5, 000		5, 000
Oneida	35, 000		35, 000
Owyhee	200, 000	230, 000	430, 000
Shoshone	50, 000		50, 000
Total	1, 500, 000	2, 000, 000	3, 500, 000

The maps of the mining districts of this county have been taken from F. J. Scott's map of the new mining regions of Idaho.



ATLANTA AND ROCKY BAR.

ALTURAS COUNTY.

Rocky Bar is situated in the western part of Alturas County, on Bear Creek, a tributary of the South Boise River. The mines here are al gold mines, the ore being either free milling or rich sulphurets. The chief mines which have been worked during the past year are the Idaho and Vishnu and the Ada Ellmore.

The Idaho and Vishnu rank with the best gold mines of the Territory, but until lately have not been systematically worked. The owners had leased them to miners of limited means, who extracted the ore without keeping development work ahead, and left the mine in bad condition; in fact, with nothing in sight. The ore that had been taken out was from above a tunnel level on the southwest end of the property, which cut the lode at a depth of 250 feet. The vein at that point averaged about 4 feet of free-milling ore, yielding about $65 per ton, and as nearly as can be ascertained about $800,000 had been extracted.

During the past year the property changed hands, and under an able and experienced management work has been vigorously and systematically pushed forward. In exploration of virgin ground northeast from the tunnel a vein was found on which they have drifted for 110 feet. It varies in thickness from 18 inches to 3 feet, and the ore is of high grade, worth not less than $100 per ton.

No mill runs were made of this ore during 1882, but it is expected that the mill will be started early in 1883, and with sufficient ore on hand to continue to run for some time to come.

The Ada Ellmore has long been a large producer of gold, and since it was first opened has produced over $1,000,000. It is a true fissure vein, of free-gold bearing ore, 4 feet wide, which will probably average $60 to the ton.

The new hoisting works have been completed and were started early in the year. Their character may be ascertained by stating the following dimensions: Engine-house, 40 by 40 feet; boiler-house, 60 by 36 feet; shaft-house, 27 by 41 feet, three stories or 70 feet high; shaft, two compartments, 6 by 14 feet in the clear; hoisting engine, 18 by 32 feet, 125 horse-power; pumping engine, 18 by 36 feet, 125 horse-power; hoisting drum, 8 feet in diameter, 8 feet long; two boilers, each 4-foot shell, 16 feet long; each boiler has 53-inch return flues; smoke-stack, 30 inches in diameter, 55 feet high. Smoke-stack is independent of boiler, thereby lessening danger of fire. Have 8-inch plunger-pump, which takes water from third level, and 7-inch "lift" or Cornish pump.

During the latter part of the year the ore extracted was of lower grade, but it is reported that a high-grade ore chimney has been struck, and the mine promises to produce as well in the future as it has in the past.

There are a number of other mines in this district which, under careful, intelligent, and economical management, could be made to yield large returns and give a future of importance and influence to a section of country which has not hitherto attracted the attention its importance demands.

Fifteen miles north of Rocky Bar is *Atlanta*, on the Middle Boise River. The formation in this district is granite, with dikes of syenite and varieties of porphyry. The veins carry both gold and silver, and run nearly east and west.

The principal ledge is the Atlanta, on Atlanta Hill, which has been traced for a distance of nearly 2 miles, and from 30 to 80 feet in width. In this there are several veins carrying ruby silver, silver glance, black sulphuret, native silver, and free gold. The chief mines on this lode are the Buffalo, Monarch, Last Chance, and Leonora.

The Buffalo has continued its operations steadily. Since 1874 it has produced an average of $100,000, two-thirds of which was silver and the remainder gold.

The Monarch is an old mine, having been located nineteen years ago. The property consists of 1,600 feet, running east from the center of Quartz Gulch. The ore was formerly worked with a wet-crushing, 10-stamp mill, but the result was unsatisfactory, and the company owning the mine leased it until 1878. Since that time it has been operated by the company, the lessees having found the mine so profitable that the company refused to renew the lease.

The mine is opened by three tunnels, the upper one being in 500 feet, the second 800 feet, and the lower 1,800 feet. Cross-cuts are run every 50 feet. The vein as exposed is large in places, upwards of 50 feet in width, with well-defined walls. The ore runs in seams of varying width and of extreme richness. The clay seam on the hanging wall contains kidneys of ore, yielding in some instances as high as $2,000 per ton.

Although the mine has been advantageously worked by tunnels, a shaft has also been sunk, now nearly 250 feet in depth, with two working compartments and an additional one for pumping. Fine hoisting works have been in process of erection during the year, which have a capacity to sink to 1,000 feet. The engine is of 60 horse-power, double-acting, and all the appointments are first class and of the best material. The mine is the property of the Atlanta Mining Company, who contemplate erecting a new 20-stamp mill early in 1883.

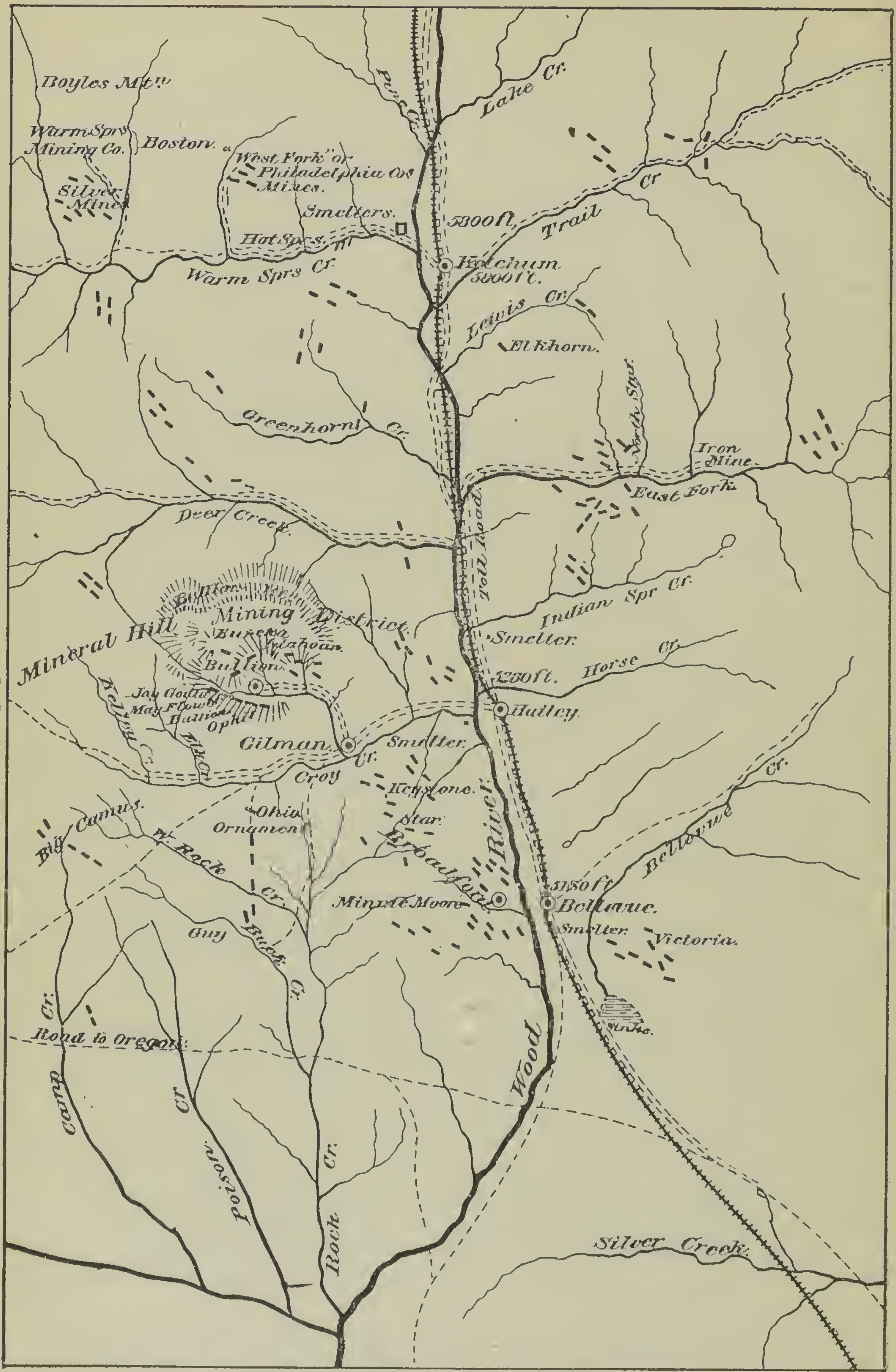
The Leonora mine changed hands in the latter part of the year. This mine will probably be supplied with a 20-stamp mill during 1883.

The Last Chance mine is the property of the Atlanta Hill Gold Mining Company. The ore is free milling, taken from a 3-foot vein, opened by a shaft of about 400 feet in depth, and yields $75 to the ton. The sulphurets are sorted from the free-milling ore and concentrated, after which they assay $300 to the ton. The company contemplate erecting a chloridizing furnace for treating the concentrates. Operations were suspended at this mine early in November, owing to the early and deep fall of snow, which not only prevented hauling ore to the mill, but obstructed transportation before winter supplies of provisions, &c., had been procured.

Another season will undoubtedly be one of prosperity for the camp of Atlanta. A good wagon-road is much needed to cheapen transportation, and the present development of the mines, the amount and richness of the ore in sight are sufficient to insure this long-required improvement.

That portion of Alturas County known collectively as the *Wood River Country* is still in its infancy as a mining section, but the number, size, and richness of its lodes, the facility with which they can be opened and worked, combined with the natural advantages of the region in respect to wood and water, are rapidly bringing it to the front, and it cannot be long before it will rank with the most productive sources of the mineral wealth of the country.

Wood River takes its source in the same range of mountains as the Salmon River, the latter flowing to the north and Wood River in a southerly direction to its confluence with the Snake River. The mining camps scattered along the river are best reached by stage from Blackfoot, on the Utah and Northern Railroad, or from Kelton, on the Central Pacific.



MAP OF LOWER WOOD RIVER.

The Oregon Short line, now in process of construction, will cross Wood River about 40 miles south of Bellevue, the first town on the river, and a branch line will be built to Bellevue, and from thence to Hailey, Ketchum, Golden, and other points further up the river.

At Bellevue there are a number of mines rapidly growing in prominence.

The Minnie Moore, between 1 and 2 miles west of the town, and on the opposite side of the river, is the best developed mine in this vicinity. The ledge outcrops about 200 feet above the bottom of the gulch, and runs parallel with the trend of the hill. The outcrop is not prominent, but covered with slide and *débris* from the mountain above to various depths, and the surface indications are but little guide to the massiveness of the ledge. The main working shaft following the vein is about 160 feet deep, and levels have been run every 50 feet east and west on the vein.

The first level has been driven to the east about 225 feet and 60 feet west; the second level 100 feet west and 90 east, where it is connected with an air-shaft which affords excellent ventilation to both of the levels. The third level has been driven 110 feet west, and is connected by an upraise with the 100-foot level.

About 300 or 400 feet east of the main shaft another shaft has been sunk to the depth of about 40 feet, for the purpose of further prospecting and exploring this portion of the mine. A strong vein of rich ore has been encountered, which promises to be as extensive as in the better developed portion.

Mr. H. E. Miller is the resident manager, and under his able superintendence the mine has been systematically opened and put into shape to enable a large output of ore to be made at any time. As no reduction works have been at hand for the proper working of the ore, the higher grades extracted in the process of development have been shipped to Omaha or Salt Lake City.

The surface improvements have not been unattended to. Steam hoisting works were erected during the year, engine-house, shops, and ore-house built, and upon the advent of the railroad the property will be in good shape to make a large and continuous output of ore.

The Penobscot is an extension of Minnie Moore, and is being opened by a tunnel. It is favorably situated for easy shipment of ore. In fact, all the mines of Lower Wood River have this advantage, that there are no steep grades for ore teams such as have to be contended with higher up the river, and in the Sawtooth and Salmon River country.

The Mammoth mine is the property of the Pet Mining Company, and has been developed and worked with vigor during the year. The ore-body is showing up nearly as large as in the Minnie Moore, but the average ore will not assay as high as the galena from the latter. The company have been erecting a 40-ton water-jacket smelter for the treatment of their ore. That taken out prior to work commencing for the smelter was shipped to Omaha and Salt Lake City for treatment.

The Michigan mine is adjacent to the Penobscot, and wherever opened shows a strong vein. A small force was employed in running a tunnel which will intersect the vein at a vertical depth of 75 feet.

The Star mine, about 2 miles northwest from the Minnie Moore, and in Star Gulch, is proving to be one of the best mines and a good ore producer. The ore is galena and gray copper. The owners leased it during the year, and it was actively worked.

Ten miles west of Bellevue is the Ornament group of mines. The

Ornament and Ohio are near to and south of Croy Creek and the Guy on Rock Creek; these may be considered typical mines of the group.

The mines in the valley of Rock Creek and on the streams that lie west of it and flow into Camus Creek, a tributary of Wood River, are gold-bearing as well as rich in silver. They are nearly all in granite, and the veins are usually narrow, although the ore is rich. The quartz carries copper and silver glance that assays from 2,000 to 3,000 ounces to the ton, besides black sulphurets and chlorides.

In the Guy mine very beautiful specimens of crystallized silver have frequently been found. There are also a number of large ledges carrying gold only; the ore, however, is low grade, and would not probably yield over $15 to the ton; it is free milling.

On the east or Bellevue side of Wood River there are a number of promising mines on Lookout Mountain.

The Monday mine is worked by the Silver Crescent Company. It is a shale formation, the ore consisting of dry carbonate and high-grade lead. Sample lots shipped to and reduced at Salt Lake City yielded 650 ounces to the ton. No stoping has been done, the ore extracted being in the process of developing the mine.

The Thursday is an extension of the Monday, and is the property of the same company, which is incorporated in Indiana. So far as work has been done on this mine, the showing is satisfactory.

The Bellevue Mining Company own the Dead Shot, Chicago, and Sadie. These three mines are on the same ledge; the ore is lead and dry carbonate.

The Dead Shot is opened by shaft and three tunnels. The ore in the face of the upper tunnel is about 4 feet in thickness, with a soft formation on both walls, and can be taken down with but little assorting.

The Chicago and Sadie are both being developed by tunnels. A tunnel is being driven from the foot of the mountain, that will tap the ledge at a vertical depth of 400 feet and provide drainage for the mines. The property is well managed, and work is forwarded with such vigor that at an early day will make these mines heavy producers of bullion.

The Queen Victoria, Runover, Town View, Winter's Work, all look well for the amount of development.

The Albion mine, situated at the head of Lee's Gulch, about 2½ miles from Bellevue, is one of the promising prospects in the vicinity. The ledge is a contact of lime and granite, and although not much work has been done it shows up in good shape. Four cuts have been run, the deepest about 20 feet, exposing 30 inches of galena, assaying 80 ounces of silver per ton and 70 per cent. of lead.

Five miles north of Bellevue is the town of Hailey, now the county seat of Alturas County. There are no mines of prominence in the immediate vicinity of the town, but as it will probably be the terminus of the broad-gauge branch of the Oregon Short line, from which branch roads will diverge to the various camps and rich mining districts west, north, and east of this point, it will not only be an important railroad center, but a supply depot for the whole Wood River mining section.

On Croy Creek, about 7 miles west of Hailey, is *Bullion district*, which has made a larger output of ore than any other district on Wood River. The principal mines which have been worked during the year are the Idahoan, Bullion, Jay Gould, Mayflower, Eureka, and O. K.

The Idahoan is situated high on the mountain, on the west side of a small gulch leading into Croy Creek, and about one mile east of the town of Bullion. An excellent natural road of easy grade leads up to the mine, greatly facilitating the shipments of ore, as teams can be driven directly to the ore-house at the mouth of the tunnel. This lode was one of the earliest discoveries in this section, its bold outcrop pointing unmistakably to the mineral wealth lying beneath. It is a contact, blue lime and shale, running nearly east and west, the workings being at the east end. The ledge is nearly perpendicular, having only a slight dip to the north. The ore is a compact galena with streaks of gray copper. At the surface the ledge was about 13 feet wide, but as depth was attained it increased to 20 or 25 feet between the walls. The vein, which at first was nearly solid, broke up, as the ledge widened, into seams and small veins, varying from a few inches to 5 feet. Between these veins it is not, however, barren ground, but quartz mixed with galena and rich carbonates, constituting a good second-class ore, which, by concentration with jiggers, could be made much more available and profitable for shipping. From the angles of dip of the main veins, and from their persistency, it is extremely probable that inside of 100 feet additional in depth they will coalesce and form a solid continuous ore-body. The mine is opened by shaft and tunnels.

The upper tunnel or drift was run in on the vein for about 350 feet, and much good ore was extracted. This tunnel was driven in a soft formation adjoining the foot wall. which did not require blasting, and through it many pockets and kidneys of rich ore were found, the main vein being exposed on the north side of the tunnel. The lower tunnel driven from the gulch taps the vein 77 feet below the upper tunnel, and affords excellent drainage to the mine. The main shaft is located near the mouth of the upper tunnel, and drifts have been run from it, all in good ore. Although much of the mining has been in hard ground, which would probably stand without support, yet work has been done with a view to giving permanence to the mine. The tunnels are well timbered and lagged, and an iron tramway laid, upon which the ore-cars run out the ore.

The surface improvements consist of a shaft-house, ore-house, and other necessary buildings. But little ore has been taken out except in developing the mine, but the amount sold not only paid all the expenses of working, but left a handsome surplus for division among the owners.

During the last two years, 963 tons of high-grade ore were shipped to Omaha and Melrose, which sold for $118,845, and 750 tons of second-class ore were sold to the Philadelphia Company's smelter at Ketchum for from $65 to $75 per ton. A large amount of high-grade ore remains in the ore-house, and the shipments could easily have been doubled if wagon transportation to the railroad could have been obtained.

In 1881 about 50 mines shipped ore to a greater or less extent, and in 1882 at least 300 were shipping, and the means of transportation were no greater than they had been during the preceding year.

The mine is under the able superintendence of Judge A. P. Turner, who is not only resident manager, but one of the chief owners.

The Bullion mine is located on Bullion Mountain, immediately south of the town of the same name. The work in this mine during 1881 was sufficient to show that it was a mine of great promise, and returns from shipments of ore proved its richness. During 1882 but little ore was shipped, as the cost of transportation was heavy in comparison with what it will be when the railroad to Wood River is completed. Development work, however, steadily progressed, and a large amount of ore is in sight in the mine. The ore is largely composed of gray copper of high assay value, and although the veins and seams through the ledge are comparatively narrow, yet this is compensated for by the richness of the ore. The mine has been actively prospected, the work of the past year having been apparently more for the purpose of ascertaining its capabilities than for profit, and the underground work is therefore not in as good shape as could be desired, but this can readily be remedied as the extraction of ore progresses, and the permanency of the mine will be better established. In the latter part of the year the Bullion mine changed owners, and it is reported that during November and December upwards of 325 tons of ore were shipped to Salt Lake City, where it was sold for nearly $300 per ton.

Next to the Bullion comes the Mayflower, which during 1882 was the largest shipper of ores of any of the mines of this camp. The ore is similar in character to that from the Bullion mine. The mine is opened by shafts and tunnels, which have exposed a large amount of ore still standing and awaiting either reduction works or cheaper transportation. Concentrating machinery was erected for the purpose of working the low-grade ores, and hoisting machinery constructed. The mine is the property of Chicago parties, and operations are superintended by Mr. G. L. Haven.

The Jay Gould is an extension of the Mayflower, and as in other mines of the group, more attention was paid to development than to production. The shipments of ore were chiefly that extracted in running tunnels and drifts. The company leased the mine for the winter, as they were unwilling to accumulate ore on the dump, the value of which could not be realized until the spring or summer of 1883. The lessee is working 12 or 15 men all winter, and it is reported that in running a tunnel to cut the ledge a large vein of galena was unexpectedly struck which assays 175 ounces of silver to the ton, and carries 60 per cent. of lead.

The Eureka, northeast from the Jay Gould, and on the opposite mountain, was lying idle most of the season. New machinery has been purchased and will be ready to erect in time for starting the mine for a summer's work in 1883. It has a fine showing, and doubtless will become a valuable property.

On the divide between Bullion and Deer Creek and north of the former camp is the French group, which lately attracted some attention. Several claims of the group are being opened by an Ohio company, and the prospects are favorable for becoming good mines.

The Wolf Tone, on the South Fork of Deer Creek, is a contact between lime and quartzite, and the ore is galena and carbonate with a lime and iron gangue, making an excellent smelting ore. The mine was discovered in 1881, but no work of importance was done until the summer, when it changed hands and became the property of the Lemhi Mining Company of Philadelphia, who immediately commenced operations. The ore makes great improvement as depth is attained. A considerable amount is ready for stoping, and it was understood that work would be prosecuted all winter.

The Narrow Gauge group comprises the most prominent Deer Creek mines—the Narrow Gauge No. 1, No. 2, and the Bannock. These mines were sold during the last summer to Chicago parties, who at once inaugurated work, and it is reported that 125 tons of ore were extracted that sold for upwards of $30,000.

The Davitt, Montana, and Washington mines all were shippers of ore to a small extent. In Quigley Gulch, 5 miles east of Hailey, the Ophir group, near the head of the gulch, are regarded as valuable mines. They comprise four claims, all showing high-grade galena. They are advantageously located for working, as wood and water are abundant, and there is an easy grade by which wagons can be taken directly to the mines. They belong to a Chicago company which contemplates developing them during the coming season.

Sixteen miles up Wood River from Hailey is the town of Ketchum, the central point of *Warm Springs district.* This district extends from Deer Creek on the south to Galena on the north, and comprises the mines upon the East Fork of Wood River, Trail Creek, Lake Creek, and Boulder Creek, east of Wood River, and Warm Springs Creek and the whole section of country west from Wood River to the Big and Little Smokies.

This district is developing into one of the most promising mining sections of Idaho, and not a little of its prosperity is due to the successful operation of the smelter of the Philadelphia Mining and Smelting Company, which provides a market for the ores of the district.

The works of the company are situated on the west bank of Wood River, about half a mile above the town of Ketchum. They are well arranged for the reduction of ore. The ore is received in a commodious ore-house, where it is sorted and placed in bins. The smelters, two water-jackets of 40 tons capacity each, are erected on the floor below, so that it is unnecessary to raise the ore and fluxes in charging them. Charcoal is employed, which is manufactured at the works, twenty kilns having been erected for this purpose. The wood is delivered at the kilns by a V-flume 4 miles in length, and costs $1.50 per cord, which makes the cost of charcoal from 9 to 11 cents per bushel. The capacity of the kilns is 1,500 bushels per day.

A matting furnace was also built during the year for working the more refractory ores containing copper. The rich matte produced is shipped to Philadelphia, and the poorer residues are worked over again in the smelters.

An excellent iron ore (hematite) for fluxing purposes is obtained from a mine of that ore situated on the East Fork of Wood River, and calcareous tufa is abundant in Elkhorn Gulch.

I am indebted to Mr. John B. Hastings, United States deputy mineral surveyor at Ketchum, for the following summary of shipments during the year to the smelter, and also for some details in relation to the mines of that vicinity:

Mines.	Amount shipped.	Lead recovered.	Silver produced.
	Tons.	*Pounds.*	*Ounces.*
Elkhorn	812, 000	699, 240	73, 043. 08
Bully Boy	2, 819	3, 749	169. 14
Badger	2, 809	2, 749	285. 45
J. Cummings	962	831	94. 32
Occidental	2, 672	1, 971	119. 68
Mountain Girl	10, 690	10, 474	709. 29
Moonlight	3, 784	4, 391	875. 93
Montana	12, 207	13, 528	1, 855. 78
Guy	41, 203	21, 268	4, 596. 07
Ontario	4, 850	5, 742	636. 37
Star	47, 362	47, 410	5, 134. 35
Wood River Smelter	93, 718	17, 766	3, 222. 02
Colorado	14, 471	17, 246	1, 326. 26
Ohio	1, 410	1, 502	197. 18
Idahoan	252, 502	181, 244	10, 184. 32
Carrie Leonard	4, 499	1, 438	451. 09
Davitt	16, 387	20, 290	1, 372. 57
Isabella	34, 583	....	4, 289. 11
Humboldt	529	418	32. 43
Solace	26, 717	....	9, 778. 60
Blackhorse	38, 444	32, 038	2, 887. 49
Merrimac	2,126	1, 286	89. 61
Mountain	6, 133	6, 599	458. 80
Elephant	405	351	35. 48
Silver Fortune	1, 575	1, 600	41, 26
Boulder	528	252	21. 00
Back Pay	756	586	160. 94
Erwin	302, 352	188, 092	15, 253. 21
West Fork	69, 809	45, 513	6, 596. 75
Black Hawk	97, 621	45, 499	7, 593. 34
Paymaster	2, 823	1, 919	88. 92
Total	1, 908, 746	1, 374, 992	151, 599. 84

This gives an average production of between 79 and 80 ounces of silver per ton of ore and 36 per cent. of lead. The value of Wood River ores cannot be estimated from this result, as some of the largest shippers of ore to the smelter sold only low-grade ore and shipped their high grade to Omaha, Salt Lake City, or Melrose.

The West Fork and Black Hawk mines have been systematically worked, and shipments were made to the smelter until the roads were obstructed by snow. The company contemplated keeping a force of 10 men employed all winter in taking out ore for shipment in the spring.

The Erwin employed 23 men in taking out ore, and a large dump, estimated at 200 tons of first-class ore, now lies on the surface. At present a good rich vein of from 2 to 4 feet, consisting chiefly of galena, is visible in the breast of the works, and everything indicates the feasibility of extracting large quantities of ore for spring shipment. In view of this, the management will continue a force of about ten men, working the ground to the best possible advantage.

The Iron King has a pay streak of 18 inches in width; there is a small amount of ore on the dump, and the mine will be worked all winter, as will also the Great Eastern, Solid Man, and Homestake. The Solid Man has 8 inches of galena and carbonates, and the Homestake 10 inches of the same.

On Warm Spring Creek is the Ontario, which shipped 177 tons of ore and received for the same $20,854.89 from Conklin & Moulton's sampling works at Hailey. The vein pitches to the northeast at an angle of 33°, and appears well, being about 80 inches wide. The ore is chiefly high-grade galena, with some carbonates. There are now blocked out in the mine 250 tons of ore, and 5 or 6 men will be employed all winter.

The Black Horse, besides having a fair showing in the tunnel face, has about 30 tons on the dump, which early snows prevented shipping.

On the Mountain Girl an incline is sunk on the ledge for 50 feet, showing a continuous pay streak from 10 to 80 inches wide.

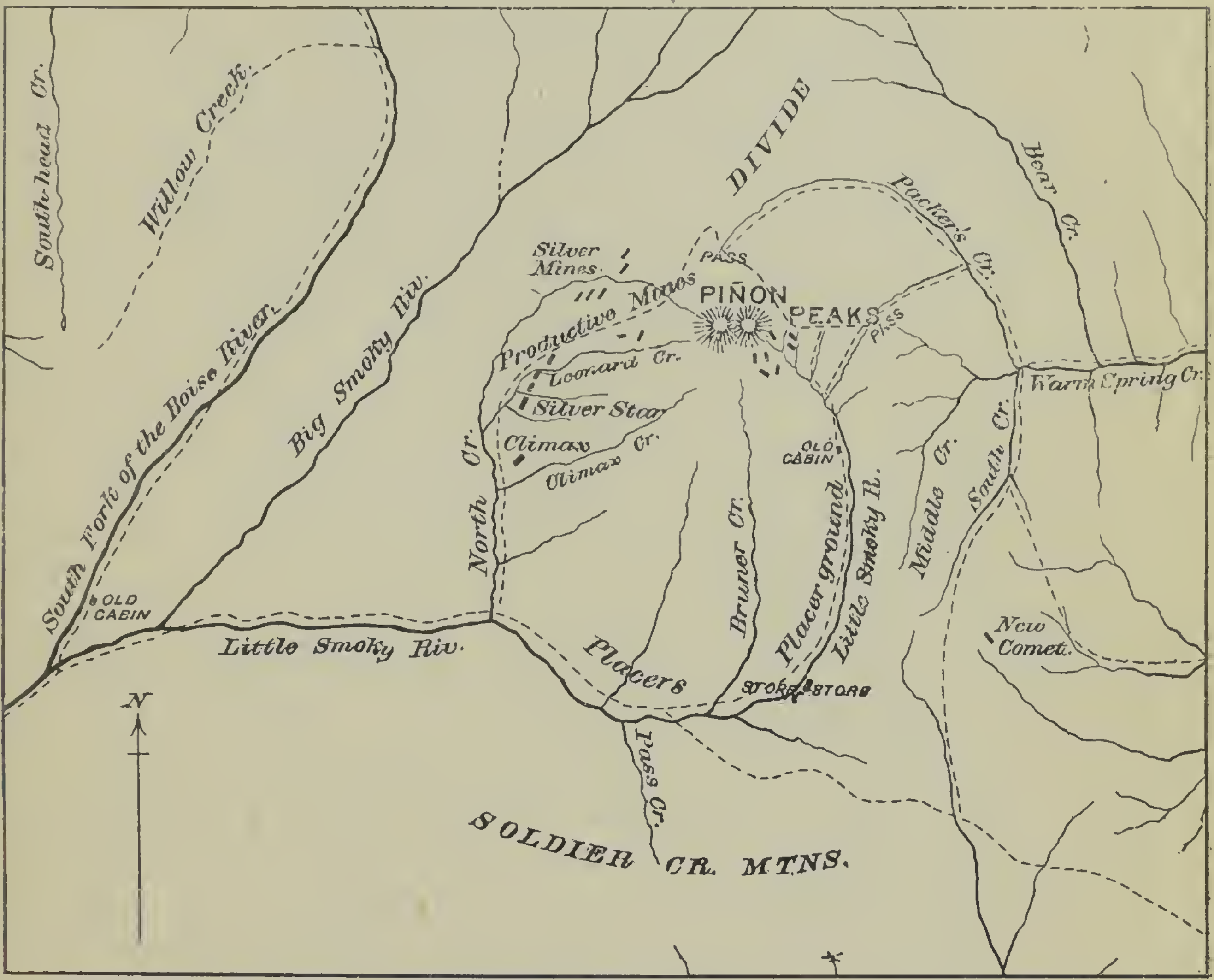
The Cummings, besides the small shipment made to the smelter, has about 3 tons on the dump, and an adjoining claim, the Old Ireland, has a well-defined ledge with a 10-inch pay streak.

On the east side of Wood River the chief mine is the Elkhorn, located about 3½ miles east of Ketchum. It is a fissure vein in a black lime formation, and has been prospected in its course for 600 feet. The ledge dips to the east at an angle of from 35° to 60°, with perfect walls. The shaft is sunk 110 feet, the lower 73 feet in standing ore. Tunnel No. 1 begun 300 feet east of shaft, down the hill, and, tapping it 110 feet below the surface, carries a fine large body of ore from within 50 feet of its mouth to the shaft. Incline No. 1, in tunnel No. 1, lies 230 feet from its commencement, and is sunk 50 feet entirely in ore. Incline No. 2, 110 feet in, is sunk 20 feet in ore. Tunnel No. 2 begun 500 feet west of shaft, and now 85 feet in length, will, when completed, reach the course of shaft at a depth of 210 feet, having followed the ledge a distance of nearly 460 feet. Its length at every point is a solid, well-defined ledge of galena and carbonates, up to the standard grade in sample assays, and ranging in width from 2 to 9 feet.

Adjoining the Elkhorn is the Noonday, located on the Elkhorn ledge, which has been exposed to a depth of 75 feet and 100 feet on its course. There are about 60 tons of ore showing in the upper tunnels and on the dump. A small force will work in this mine all winter.

The Badger, Juniata, and Ray lie side by side to the north and adjoining the Elkhorn. Their owners confidently claim a parallel ledge to the latter. The Badger has a tunnel in a distance of 150 feet, from which 15 tons of ore have been shipped to Salt Lake, selling at $125 per ton.

The Juniata has a tunnel 60 feet on the same character of mineral as the Badger. They both carry galena and carbonates and run high in silver, with from 40 to 60 per cent. lead.



SMOKY DISTRICT.

In Elkhorn Gulch, opposite the Elkhorn, is situated the Iron mine. A shaft has been sunk on the ledge, with a fine showing of galena and carbonates. A tunnel is being driven to tap the ore-body, which has only about 40 feet more to run.

The Paymaster mine, on East Fork, is owned by the Philadelphia Company, and is being opened by an incline on the ledge, and also a tunnel. The incline is down 30 feet and exposes an 18-inch vein of galena. The tunnel will cut the ledge at a depth of 100 feet, and has already struck pockets of galena, although it has been driven but a short distance.

The Morning Star is the first extension of the North Star, and makes a fine showing for the amount of work that has been done.

Twenty-five miles west of Ketchum are the *Smoky districts.* The ledges consist of large veins of low-grade galena ores, carrying from 20 to 50 ounces of silver to the ton and from 30 to 50 per cent. of lead.

The Carrie Leonard has been opened by a tunnel of 175 feet in length, and a shaft at its mouth 28 feet deep. Both are in ore all the way, and the workings show a steady and continuous vein averaging 3 feet in width. There are about 100 tons of ore on the dump.

The Silver Star and Salamander have about 400 tons of mixed ore awaiting shipment.

The King of the West and Climax are both looking well. The former has two shafts on the ledge, which seems to be well in place; the latter has a 50-foot shaft, with ore all the way and about 100 tons on the dump.

Some time in the future, nearer railway communication may make these mines available. At present, however, the cost of transportation is too great to permit shipping any but the best-selected ore.

There is a large extent of country in this section of Alturas County still to be prospected, and it offers a fair field for success. The winters are the chief drawback, but, aside from deep snows, they are mild and form no serious obstacle to working mines that are properly supplied and provided with necessary materials and equipments.

Galena district comprises the mining section at the head of Wood River, with the town of Galena as its supply depot.

The chief group of mines is the Senate group, owned by the Senate Mining and Smelting Company. The Senate, Red Cloud, Chief, None Such, and Kid mines constitute this group, and are all rich and permanent-looking prospects. The property of the company is being put in good shape for successful and prosperous operations. They have completed their smelter and proved its capabilities by a trial run. They have also acquired the Scorpion claim, a valuable lime quarry, which will provide flux for the smelter.

The Gladiator is opened by a tunnel 400 feet long, but it has not yet cut the ledge, which will be reached in another 100 feet. This will give a vertical depth from the surface of 400 feet. There are also two shafts, 60 and 70 feet deep, respectively, showing ore to the full depth. A small shipment of ore was made to the Senate smelter, and about 10 tons remain on the dump.

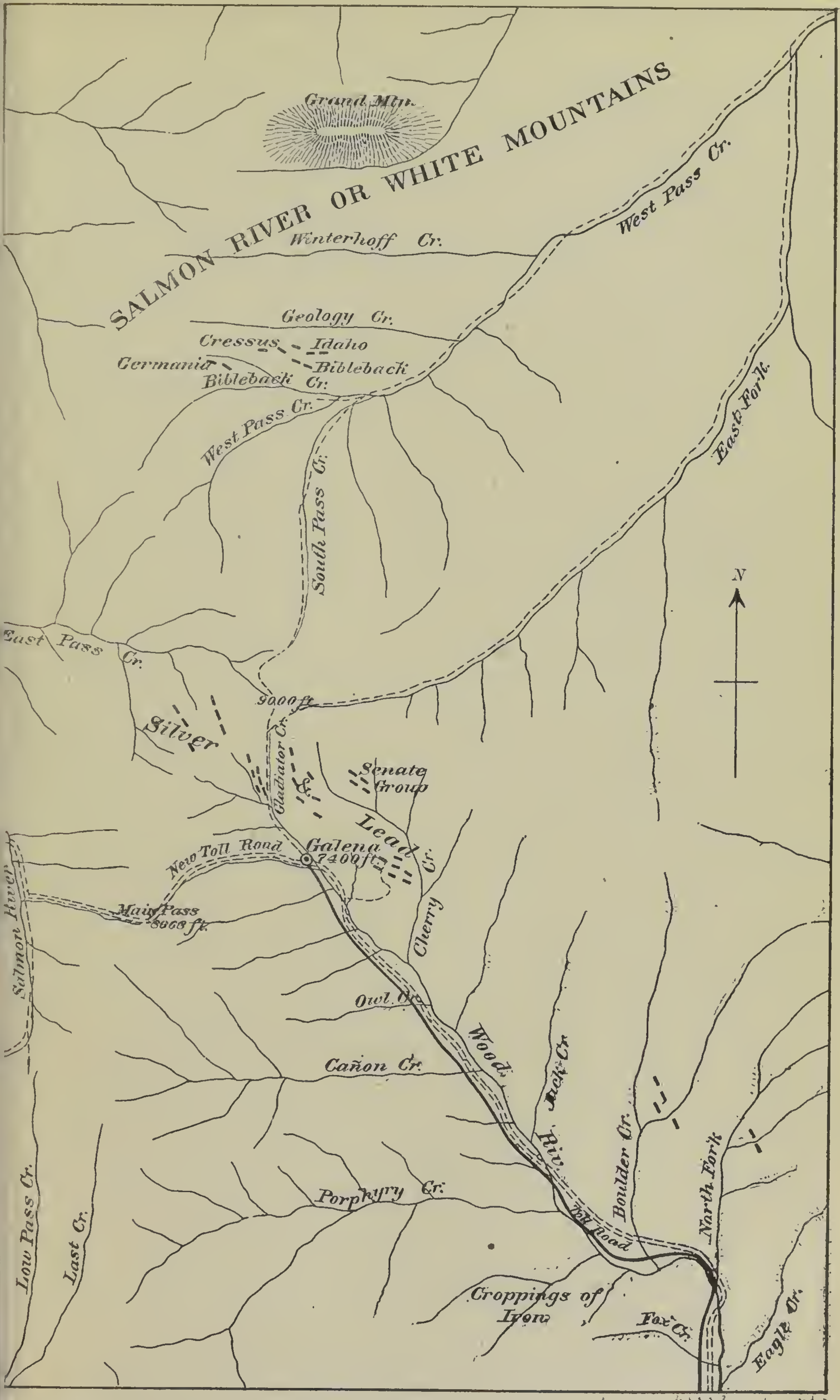
The Conway Castle, President, and Delta adjoin the Senate and Red Cloud, and are the property of the Conway Castle Mining Company, a New York organization.

A tunnel has been run 84 feet on the vein of the Conway Castle, which is reported to be 6 feet in width at the heading. Assays have been made of the gangue, which show 50 per cent. in lead and as high as 350 ounces in silver. The vein has been cut at intervals. The length of the claim is 1,500 feet. A continuous vein has also been found in the President, where a shaft is now being sunk. The company have constructed good roads, blacksmith shop, boarding-house, and are preparing to prosecute the work with vigor.

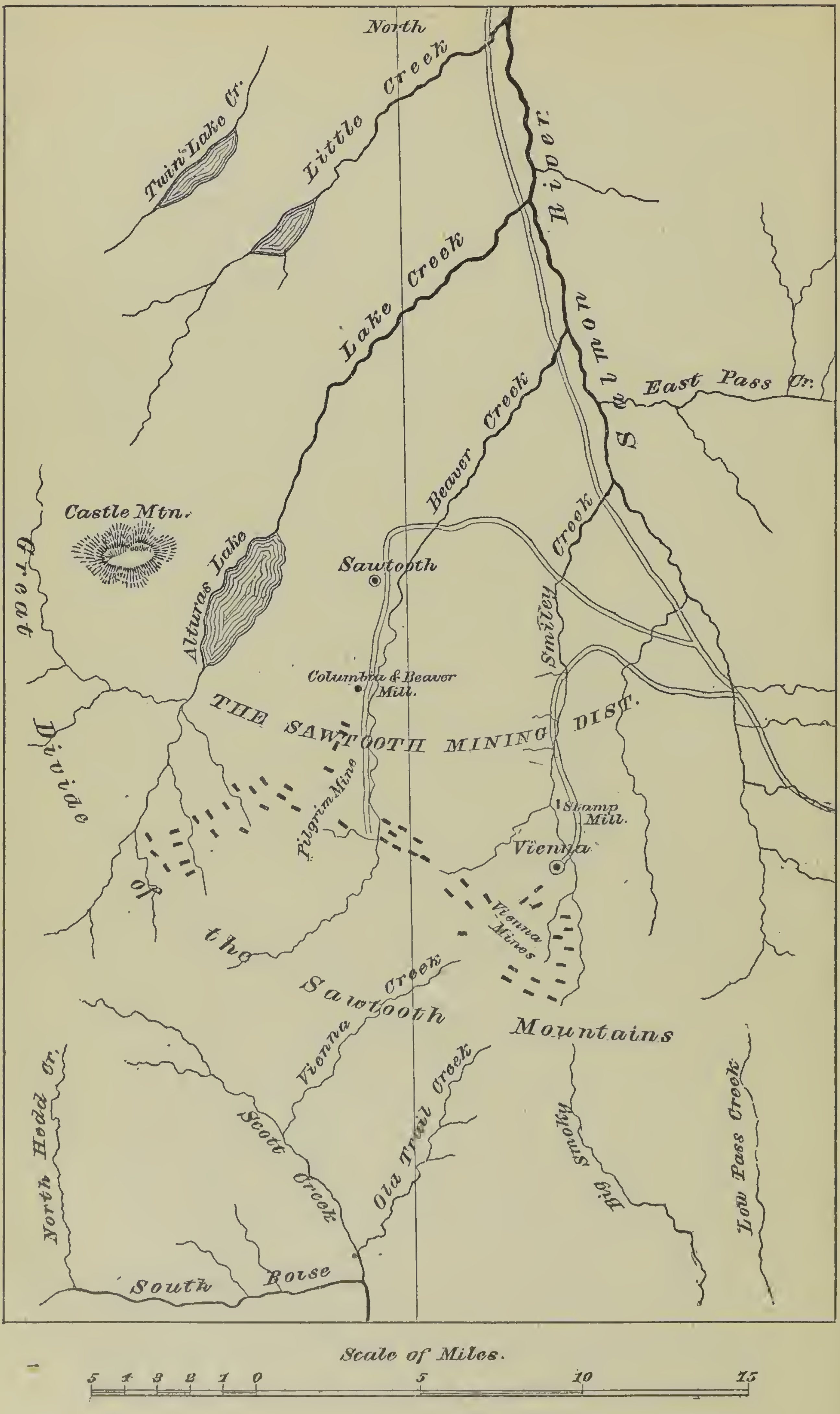
An important discovery is the Dresden. The ledge has a prominent cropping of white lime, which is traceable for 2,000 feet, and so far wherever this cap is removed the galena appears. At a point where the vein has been entirely stripped for 12 or 15 feet the ore seam has an average width of 2 feet. The lowest assays of this ore gave a result of 90 ounces, and the highest 180 ounces, but the average is about 140 ounces per ton. A tunnel has been driven in about 20 feet, and will cut the vein within 10 feet more at a depth of 25 feet.

For much of the information respecting *Sawtooth district*, I am indebted to Mr. W. A. Brodhead. This district comprises the mining section, situated upon the extreme headwaters of the Salmon River, and derives its name from the precipitous, craggy peaks (like the teeth of a saw) of the range of mountains bearing the same name.

The geological formation of the country is of a very fine feldspathic granite. The veins are in a granite rock, well defined, and classed as



UPPER WOOD RIVER.


North
Twin Lake Cr.
Little Creek
Lake Creek
Salmon River
East Pass Cr.
Beaver Creek
Castle Mtn.
Alturas Lake
Sawtooth
Smiley Creek
Columbia & Beaver Mill.
THE SAWTOOTH MINING DIST.
Pilgrim Mine
Stamp Mill.
Vienna
Vienna Mines
Great Divide of the Sawtooth Mountains
Vienna Creek
Old Trail Creek
Scott Creek
Big Smoky
Low Pass Creek
North Hedd Cr.
South Boise
Scale of Miles.
5 4 3 2 1 0 5 10 15

true fissures, having massive breadth, and with long continued outcrops, showing their course on the surface.

The district has already shown the veins explored to be strong and permanent, and the ore to hold out steadily and answer to surface indications. The silver is principally in the form of rich sulphides, such as ruby and brittle silver, also argentiferous zinc blende and antimony sulphide. Galena is rare, if it occurs at all.

The district is divided into and known as Lake, Beaver, and Smiley Gulches or Cañons, and in each, respectively, flow creeks of the same name which are tributaries of the Salmon River.

In Lake Cañon the Atlanta mine shows a large, strong vein from 4 to 6 feet in width. This mine has been extensively explored during the past year, by a system of tunneling, and at a depth of 200 feet from the surface a fine vein of rich ore was encountered; nothing but development work was done during the year.

Adjoining the Atlanta on the east are the Summits No. 1 and No. 2, which are doubtless extensions of the former lode. Only annual assessment work has been done.

On the Lucky Boy mine but a limited amount of development was done during the year, but showing a great improvement. A quantity of ore running as high as $5,000 per ton was extracted.

The Scotia adjoins the Lucky Boy on the east. Little work was done upon it during the past season, although it has been considerably explored and much rich ore, running as high as $500 to $700 per ton, is exposed by the working.

The Mono, Baxter, Wire Silver, Comstock, Comet, and Silver Bow are upon the same belt of mineral as the Lucky Boy and Scotia, and all show flattering prospects.

Another season reduction works will be erected in Lake Cañon, when the ore can be profitably worked. The isolated position of this mining section and the difficulties attending transportation render the ores unavailable except small shipments of assorted ore which have been made at great expense.

East of Lake Gulch is Beaver Gulch, in which the town of Sawtooth is situated. It is the oldest camp in the district and the business center for the mines of Beaver Gulch.

The Pilgrim is one of the best developed mines. It has a tunnel in ore nearly 1,200 feet, with raises to the surface, and shafts sunk in the bottom of the tunnel upward of 100 feet deep, while it shows crosscuts about every 100 feet from wall to wall. The header of the tunnel is about 700 feet from the surface, and the width of the ledge varies from 10 to 25 feet, is nearly perpendicular, and incased in white granite walls. The ore of this mine is principally sulphurets and ruby silver, and the whole ledge is pay rock. Large quantities of the ore average from 3,000 to 5,000 ounces per ton, while the average value of ore is 100 ounces. There are at least 2,000 tons on the dump, while there are 10,000 tons ready to stope. Nothing, however, has been done at the mine during the year, as the owners are awaiting the erection of reduction works.

The Bidwell and Beaver extension mines run parallel with the Pilgrim mine, about half a mile north of it; they are owned by a New York corporation. The property has been pretty thoroughly opened and developed, work having been prosecuted constantly for the past two years. The mines have been explored by means of tunnels run in ore and following the course of the vein at different levels. The second tunnel or level has been driven 250 feet, making a vertical depth of 30 feet from the first level. The third has been driven 360 feet, also making a vertical depth of 130 feet, and in all 260 feet. Both tunnels have been connected by winzes, thus obviating the necessity of hoisting ore. The mines embrace an area of 3,000 linear feet by 600 in width. The property has paid the expenses of all development, and the company have stored in sacks at the mine several tons of ore of an assay value of from $500 to $2,000 per ton. The character of the ore is ruby and native silver.

The Sawtooth Company's group of mines are in close proximity to the Bidwell and Beaver extension mines. This is a new enterprise. Work has been prosecuted during the past season only, but the surface indications are of an encouraging character.

The Silver King mine is a recent valuable discovery. Being a "blind vein," it required a vast amount of patient work to find it, but when struck the owners were richly rewarded for their patience and perseverance. Fifteen tons of ore from the top yielded $500 per ton. It is a large, bold lode, and one of the most important discoveries yet made in the district. Operations are exclusively in pay rock, and instead of sorting a small from a vast quantity of ore, little of the whole amount handled is necessarily rejected. The ore is classified into first, second, and third class lots, characterized, respectively, by black sulphurets in quartz, antimonial silver, and an inferior grade of carbonates. Some of the high-grade ore assays 4,000 ounces, the antimonial silver runs as high as 770 ounces, and the third class carbonates, which exists in great abundance, will average 93 ounces. On either side of the ledge are seams of high-grade antimonial silver from 3 to 6 inches wide.

The Beaver and Columbia tunnels have been prosecuted actively during the season, and opened up considerable bodies of ore.

The 10-stamp mill of the company was completed during the past year. It is a chloridizing mill, and has given great satisfaction in the treatment of the ores. The company were compelled to close down on account of the early and unprecedented fall of snow cutting off their supplies for the winter.

On the summit of the range the Atlantic Company, after surmounting many obstacles, are now in a position to prosecute work during the coming season with fine prospects of success. Early in the season they met with great loss by fire, all their buildings, provisions, and effects being destroyed. Then they had litigations on titles, but fine quarters have been rebuilt, and differences with contestants adjusted, large quantities of supplies of every description safely stored, and a force of miners will be able to make developments for seven or eight months.

The various companies and individuals owning mines here, are working and developing for their own satisfaction, confident that it will in the end amply repay them.

Another season will be a very prosperous and profitable one for the owners of the Beaver Cañon mines.

Nine miles southwesterly from Beaver Cañon are the important mines of Smiley Cañon. The principal mining camp and supply point for the mines of this vicinity is Vienna, situated about 6 miles from the mouth of the gulch.

During the past season much activity was manifested in the Vienna or Smiley Cañon mines, and the rapidity with which the town of Vienna has grown shows the confidence and reliance of the miners in the ultimate success of their mines.

The Nellie group consists of five very important claims, owned and operated by a New York company. They are the Nellie, Nellie Extension, Hudson, Champion, and Sawtooth.

The best developed and most valuable claim is the Nellie, on which two tunnels have been run in on the vein. The first has been driven a distance of 250 feet, and the second, or lower one, a distance of 350 feet, penetrating and following a vein of quartz from 4 to 6 feet in width. In a recent cross-cut a very rich stratum of ore was cut, assaying from $70 to $3,000 per ton. Another season will find the Nellie one of the great producing mines of the district. The others of the group are only prospects, having but a limited amount of work done upon them.

The Mountain King is opened by two tunnels, one above the other, with about 100 feet vertical depth between them; they aggregate in length about 350 feet. About 1,700 tons of ore are out or in sight, which will run from 75 to 100 ounces of silver per ton.

The Solace mine has been considerably explored. A tunnel was started to tap the main ledge, but in advancing a vein was cut which was supposed to be the main vein, but in raising from the tunnel level to the surface it proved to be a blind vein carrying very rich ore. Upon further advancing the tunnel the main vein was struck at a depth of 120 feet from the surface, showing very high-grade ore. Thirty tons from this mine were sold last season, realizing $10,000. Reduction works will be erected in 1883 in connection with this mine.

The Vienna is one of the best-developed mines in Smiley Cañon, and is steadily producing very high-grade ore, several hundred tons of which have been extracted and are awaiting reduction. A tunnel run to tap the ledge, and afterwards continued along the vein to some 300 feet, has opened up some rich deposits of ore. A new strike made in a raise from the main tunnel has added materially to the value of this property. The company have also several other desirable properties not so well developed.

The Lion is located northwesterly from and parallel with the Vienna, and has perhaps the largest and richest outcrop of any mine in that immediate vicinity. A tunnel 160 feet in length cuts the vein at right angles, at a vertical depth of 95 feet from the surface. Drifts have been run on the vein from the intersection of the tunnel for a distance of 75 feet, all the way exposing a strong, well-defined vein averaging from 3 to 4 feet in width, the ore running from $150 to $450 in silver per ton, with some gold. This mine is a very fine property and will undoubtedly produce largely another season.

The Emma is the oldest location in the gulch, and as it is the same vein as the Solace, will, with the same amount of development, make an equally good showing.

There are many other mining locations in Smiley Cañon worthy of note, and another year's development work will bring them prominently to the front.

A 20 stamp quartz mill has been erected by the Vienna Consolidated Mining Company during the past year at a great expense. The mill would have been in active operation had it not been for the extraordinary depth of snow that fell early in the fall, preventing the transportation of salt, quicksilver, and other supplies for the reduction works.

By April, 1883, the Vienna Company's mill at Vienna and the Columbia mill at the town of Sawtooth will be running at their full capacity on rich ores, and a steady and constant stream of bullion is confidently expected to flow from the rich silver mines of the Sawtooth mining district.

Little Wood River district.—About 20 miles nearly due east from Hailey is Little Wood River mining district, which is rapidly acquiring prominence from the size and richness of its lodes. It comprises about 25 square miles of territory on the East Fork of Little Wood River. The formation is dolomitic lime, shale, and quartzite.

The principal mines are the Muldoon group, owned by the Little Wood River Mining and Smelting Company. The main tunnel has been run on vein and in ore a distance of 300 feet, giving a vertical depth of 700 feet from the surface, connected with a shaft to the surface, also in ore all the way. Five levels have been run from the shaft. First level, 60 feet from the surface, has been run 30 feet on each side of the shaft. Second level, 135 feet from the surface, running west from the shaft 75 feet, and east 60 feet. Third level, 160 feet from the surface, running east from the shaft 60 feet; west, 55 feet. Fourth level, 300 feet from the surface, running east from shaft 15 feet; west, 60 feet. All these workings are in ore, of which 360 tons were shipped to the smelter for reduction, leaving about 1,600 tons on the dumps and a reasonable estimate of the quantity exposed and not extracted is 10,000 tons.

There is a gravity tramway 1,300 feet in length, from the mouth of the main tunnel to a wagon-road at the foot of the mountain, with orehouses at either end, with a capacity of 150 tons.

The company, which is composed of the owners of the Philadelphia Company at Ketchum, also operate the smelting and sampling works, which consist of two 40-ton smelters with the necessary ore-crushers, &c., and are lighted by a Brush electric light. Twenty charcoal kilns, each of the capacity of 1,000 bushels, are connected with the smelters by a tramway.

The works were built last summer after the company had made a purchase of the Muldoon mine, for which $100,000 was paid. A test run of 400 tons of ore was made late in the fall, after which the works closed down for the winter. About 100 tons of bullion are piled up at the smelter, awaiting shipment. The company own a large deposit of bog iron 12 miles distant, which was found to be very superior for use as a flux, and the quantity is almost limitless. Large quantities of this iron, lime, and other requisites for smelting have been deposited at the works ready for future operations.

A new ore-body was struck in the lowest workings of the Muldoon mine, which showed a breast of 5 feet of solid galena, giving an average assay of 170 ounces of silver. This is much higher-grade ore than any heretofore found in the mine, and tends to indicate that the ore will prove richer in depth. About 30 men are employed in and about the mine, and will be kept all winter.

In Copper Cañon, a few miles northwest of Muldoon, there are large deposits of low-grade carbonates similar to those found in the Bingham Cañon mines in Utah.

The Mountain Boy is opened by a shaft of 30 feet in depth, exposing about 4 feet of galena and carbonates, which assay 80 ounces of silver to the ton, and carry 60 per cent. of lead.

The Jones and Davis group consists of four claims, upon which a tunnel 60 feet long and a shaft 25 feet in depth expose a fine vein of galena, assaying 120 ounces of silver to the ton.

The Josephine group has a 40-foot shaft in galena and carbonates of an average assay value of 60 ounces of silver.

In Garfield Gulch are the General Garfield, Bonanza Boy, and Buck horn. About 45 tons of ore have been extracted from a 3-foot vein, which assays about 90 ounces of silver per ton.

The Rose Abby has a shaft of 30 feet and a tunnel of 35 feet on a vein which is the full width of the tunnel. The ore is exceptionally good, assaying as high as 200 ounces of silver per ton.

The Ironclad has been traced by surface work for a distance of 1,000 feet. The vein, where exposed by a 20-foot open cut, is reported to be 8 feet wide, the ore assaying at the rate of 70 ounces of silver to the ton.

The Rippeto, Carbonate, and Bonanza comprise the Rippeto group. Considerable development work was done upon the Rippeto. A small shipment of ore was made, and about 20 tons remain upon the dump.

The Carbonate is located south and joins the Rippeto, showing a small vein assaying 100 ounces silver and 75 per cent. lead.

The James group comprises nine locations, which have been prospected to some slight extent by open cuts.

The Carrick group is composed of twelve claims, upon which development work alone was done.

The Abe Lincoln, Goodenough, Solid Man, and Tip Top adjoin the Muldoon on the west, and have been opened by several cuts, showing galena and carbonates at a depth of 15 or 20 feet.

The Monitor, Lexington, and Bright Star are opened by surface stripping, showing the vein in each instance. The discovery shaft is sunk to a depth of 52 feet, showing continuous ore the entire depth. At the bottom of the shaft a drift has been run 32 feet west in the vein. Two hundred feet east from the discovery shaft another shaft has been sunk 36 feet. A drift 9 feet long was run east from this shaft, the entire work showing a fine body of ore. The company have on the dump 30 tons of ore, assaying 96 ounces silver and 68 per cent. lead, besides about 100 tons second-class ore.

There are a number of other locations here upon which more or less work has been done, which will be further opened and prospected another season.

In the northeastern part of the county, upon Little Lost River, important discoveries were made in July of 1882, and *Blackburn district* was organized.

The first discovery was the Tyndall lode, the bold outcrop of which could be traced for several miles, and the vein is of great width. The ore is galena, carbonate, gray copper, with some chloride and ruby silver. Assays of the surface ore yielded from 130 to 500 ounces to the ton. A number of extensions have been located upon this ledge, the chief of which are the Daisy Black, Ingersoll, Great Northern, Alice, War Eagle, Carbonate Queen, Northern Crown, Silver Bow, Combination, Dixie, and Silver Queen.

Developments have been commenced upon several of these locations. Upwards of 1,000 tons of ore have been taken from the Daisy Black, which is improving in quality as depth is attained. On the surface the ore was nearly all gray carbonate, containing considerable silica. At 20 feet the ore is galena and carbonate of copper, assaying high in silver.

From the Ingersoll about 500 tons of ore have been extracted. The outcrop in places is 30 feet in width; character of ore, galena, carbonate, copper glance, with some ruby and sulphuret of silver. Considerable of this copper ore assays over 1,000 ounces of silver per ton, some as high as 1,500 ounces, and much of the steel galena carries over 300 ounces silver per ton.

A tunnel is now being driven along the vein into the mountain. It will continue through the Ingersoll and into the Silver Queen. A shaft is also to be opened so as to permit the running of levels and stoping. The Ingersoll will produce immense quantities of good ore as soon as properly opened. Work is going on all winter, and a larger force will be put on early next spring. The Ingersoll shows an outcrop of paying ore for over 1,000 feet along the surface, and is situated near the center of the Tyndall lode, the outcrop being nearly vertical; strike about due north.

The Alice is also showing good galena and carbonates, as also are the War Eagle and Carbonate Queen.

A smelter is in process of construction, and will be ready to commence operations early in the season of 1883. It will be of 80 tons capacity. Many more discoveries will likely be made another year, as the country has been but little prospected.

Principal mines of Alturas County which supplied specimens for the Denver Exposition of 1882.

Name of mine.	Location.	Ounces of silver per ton.	Per cent. of lead.	Remarks.
Idahoan	One mile from Bullion	101	69.5	Blue lime and shale.
Washington	Deer Creek, 6 miles from Hailey.	92	70	Granite.
Ada	Pleasant Valley, 5 miles from Hailey.	231	70.3	
Colorado Fraction	One mile from Bullion	109	70.4	Blue lime and shale.
Star	Star Gulch, 3 miles from Hailey.	294	62	Granite.
Queen of the Mountains.	Warm Spring Creek	114	66	Do.
Montana Extension	Deer Creek, 5 miles from Hailey.	432	67	Do.
Montana	do	222	68.7	Do.
Valley View	Pleasant Valley, 4½ miles from Hailey.	106	65	Do.
Narrow Gauge:				
No. 1	Narrow Gauge Gulch, 9 miles from Hailey.	163	66	White lime.
No. 2	do	90	75	Do.
Eureka	Rock Creek	20	....	Surface rock.
Mayflower:				
Sample 1	Bullion	1,340	....	Decomposed gray copper, blue lime.
Sample 2	do	158	76	Blue lime.
Sample 3	do	2,130	....	Do.
Sample 4	do	142	78	Do.
Eureka	do	140	68	Do.
Bullion:				
Sample No. 1	do	293	67	Do.
Sample No. 2	do	692	70	Do.
Ophir	do	3,773	....	Chloride ore, blue lime.
Idaho Democrat	Warm Springs Gulch, 4 miles from Hailey.	128	64	Granite and lime.
Morning Star:				
Sample 1	East Fork	131	66.6	
Sample 2	do	99	72.5	
Columbia:				
Sample 1	Beaver Gulch, Sawtooth	122	....	Granite, milling ore.
Sample 2	do	141	....	Do.
Elkhorn	Elkhorn Gulch, near Ketchum	93	64	
Mountain View	Deer Creek, 6 miles from Hailey.	154	72	Granite, milling ore.
Lion	Smiley's Gulch, Vienna	113	....	Do.
Pilgrim	Beaver Gulch, Sawtooth	286	....	Do.
Solace	Smiley's Gulch, Vienna	958	....	Do.
Nellie	do	52	....	Do.
Mountain King	do	181	....	Do.
Ohio South	Rock Creek, 7 miles from Hailey.	329	....	Croppings, granite and porphyry.
Ohio North	do	52	....	Do.
Ornament	do	228	22	Granite and porphyry.
Japan:				
Sample 1	One mile from Hailey	142	68.5	Lime.
Sample 2	do	238	66	Do.
Mike Davitt	Deer Creek, 5 miles from Hailey.	167	72.5	Granite.

Principal mines of Alturas County, &c.—Continued.

Name of mine.	Location.	Ounces of silver per ton.	Per cent. of lead.	Remarks.
Climax	Croy's Gulch, 1½ miles from Hailey.	126	69	
Valley View	Pleasant Valley, 4½ miles from Hailey.	136	72.5	
*Ironclad	East Fork	5	....	Two per cent. silica, lime.
†Ontonagon:				
No. 1	Lava Lake, 45 miles from Hailey.	40	....	
‡No. 2	do	3	....	
‖Atlanta	Atlanta City	12,161	....	
Guy:				
Sample 1	Rock Creek, 10 miles from Hailey.	112	21	
Sample 2	do	420	40	
West Fork	Warm Spring Creek	122	56.4	
Midnight	Warm Spring Creek, 7 miles from Ketchum.	82	59	
Senate	Two miles from Galena			
Tenderfoot	Four miles from Galena	136	....	
Josie	One and a half miles from Galena.	97	68	
Bay State	Mile and a half from Bullion	240	62	
Jay Gould:				
Case 1	Bullion	331	76	
Case 2 Case 2	do	747 1,650	70	
Case 3	Bullion (miscellaneous pieces)	300 to 3,000	......	Two pieces of gray copper assayed 2,583 and 2,993 ounces.
Case 4 Case 5 Case 6	do	....	....	Gray copper, galena, and native silver.
Case 7	Bullion	518	75.03	
Chicago		169	70.3	
Mammoth	Near Bellevue	74	62	
Little Chief		139	41.5	
Carrie Leonard	Little Smoky	563	42.4	
King of the West	do	134	47	
North Star		63	65	

* The Ironclad specimen carries 68 per cent. of hematite iron.
† The Ontonagon No. 1 carries 32 per cent. of copper.
‡ The Ontonagon No. 2 carries 30 per cent. of copper.
‖ The Atlanta carries 4 ounces of gold to the ton.

The production of Alturas County during 1882 was $175,000 in gold and $770,000 in silver.

BOISE COUNTY.

Boise County, in the early days of mining in Idaho, was the scene of great activity. In 1863 rich placers were discovered that produced by rocker and sluice as high as 5 ounces per day. But these rich placers were soon exhausted, and, with the exception of some large mines operated by hydraulic power, which yield good returns, placer mining has given place to the more permanent pursuit of lode or vein mining.

A belt of rich mines, commencing with Gold Hill, extends northeast through the county for a distance of 40 miles or more.

In *Banner district*, in the northeastern part of the county, work was successfully prosecuted on the Banner mine, the property of the Elmira Company. The pay chute is known to be 300 feet in length. The developments made in this mine show that there are two veins instead of one. The tunnel struck a vein 15 inches wide at a distance of 878 feet; after being driven 8 feet further, it struck a second vein, which varies from 6 to 15 inches in width. The first vein dips to the south, the second one to the north. It was upon the first that the shaft was sunk 104 feet, and the second is the one upon which an upraise is now being made. After this has been cut 70 feet, a drift will be run north to intersect the shaft. Ore taken from this upraise is very rich.

The Crown Point, which is also the property of the same company, is opened to a depth of about 400 feet. All the ore that has been crushed has paid well.

The Deer Lodge is a new discovery. Several assays of the rock were made, resulting as follows: No. 1, $210.25; No. 2, $374.50; No. 3, $1,351.98. The average of the rock taken out of the ledge from wall to wall was $312.21. This location was made last summer.

The Monarch, Homestake, and Daisy are equally as good as the Deer Lodge. Assays were made from each of these mines, which resulted as follows; Monarch, $219.12; Homestake, $230.19; Daisy, $67.54. The Comet is an extension of the Daisy. The Northwest is an extension of the Homestake. There are two more locations made in that immediate vicinity, making a total of eight ledges. All except the Deer Lodge were located last fall. The character of the rock is black sulphuret.

Some hydraulic work was done on the north side of East Hill, as well as on the south side. The results are reported as better than usual.

Northeast of Banner district considerable prospecting was done upon the headwaters of Payette River, lying near the dividing line between Boise and Alturas Counties. Several locations were made, the principal being the Summit, Julia, Mammoth, Romeo, King of the Forest, and Benanne. The last two are on the east side of the mountain and below the others. The ore looks well, and the croppings gave assays of $50 to the ton.

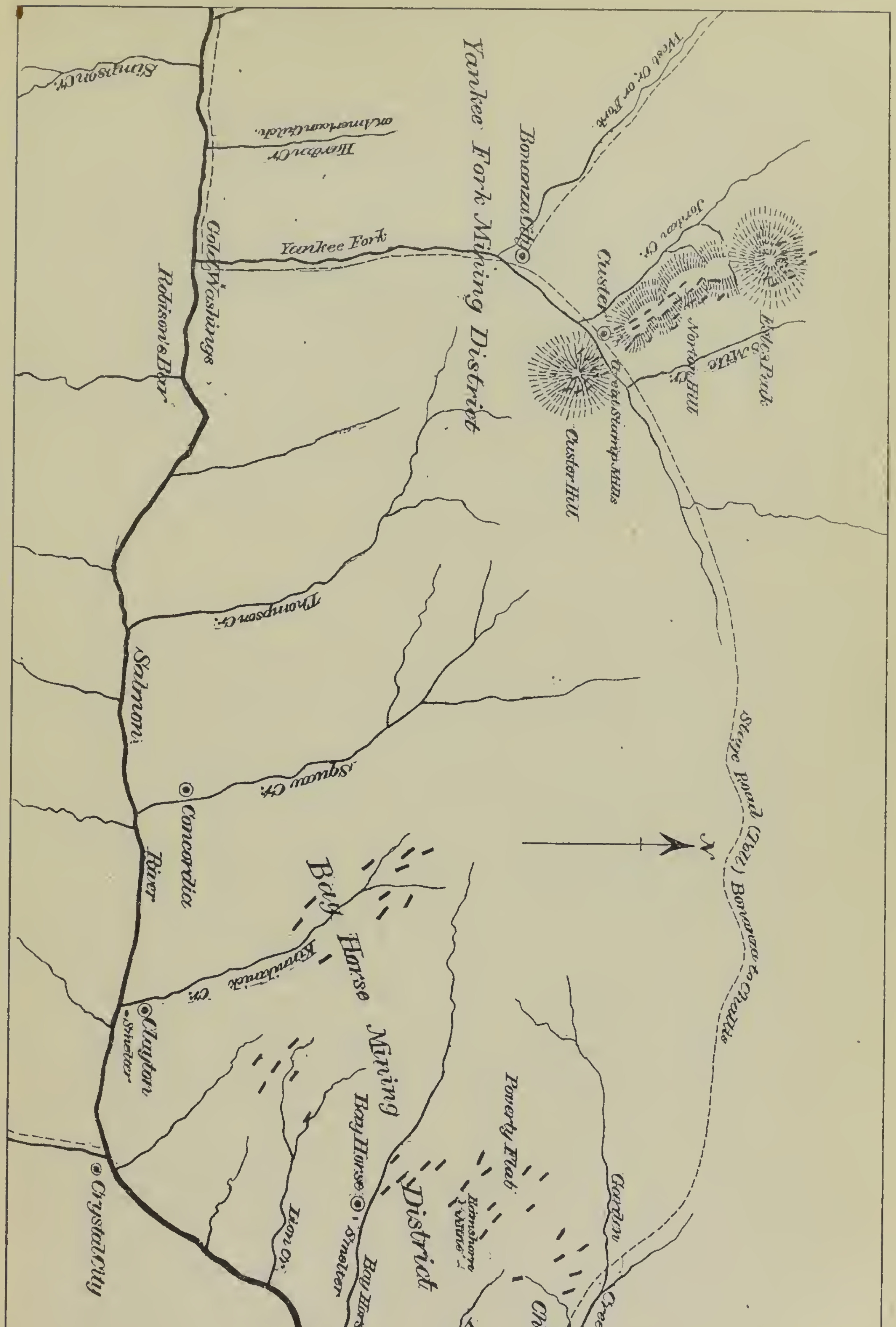
The Gold Hill Mining and Milling Company, at *Quartzburg*, own three full claims on the Gold Hill lode, extending for a distance of 2,900 feet southwest and 1,400 northeast from the discovery shaft. A shaft has been sunk 400 feet. There are three compartments in the shaft, two for hoisting, and one contains the water-pipe discharge. A double hoister is erected to operate the safety cages laden with valuable ores. The pump is of the Knowles plunger pattern, and has a 36-inch steam cylinder and 12-inch water cylinders, raising the water 400 feet, with but a single lift. There are three tunnels above the creek level, one of which is in 2,000 feet and another 2,800 feet on the ledge.

The mill is equipped with a 25-stamp mill, which is one of the first brought into the Territory. It has been used by its present owners for ten years, and, with the exception of the time consumed in necessary repairs, it has been in almost constant operation.

The ledge of the Gold Hill is free-milling ore, varying from 2 to 6 feet in thickness; the rock is decomposed quartz, 50 tons of which are crushed daily. The mineral is not high grade. The size of the ledge and facilities for working enable the company to receive large profits on the capital invested.

The Yellow Jacket is an extension of the Gold Hill. It was located in 1870, and has been operated with but few intervals since that time. It is developed by a tunnel of 450 feet, on a ledge of free-milling gold ore; the ledge varies from 2 inches to 2 feet, and averages by mill runs $18 per ton.

At *Pioneerville* the chief placer mining of the county at the present day is carried on. A large number of claims have been consolidated and are worked on an extensive scale, with highly profitable results.



YANKEE FORK AND BAY HORSE DISTRICTS.

At Squaw Creek, in the western part of the county, development work has been going on steadily during the year. A shaft is being sunk on the Liberty, which is the principal mine of the group.

About three-fourths of a mile north of the Liberty a promising ledge was discovered in the fall of the year, upon which work was commenced in sinking a shaft.

Taken as a whole, the mining interests of Boise County have shown but little improvement during the year. Those mines which under good and economical management have been paying investments for years have continued to add their usual quota of gold, and many others remain idle and in an abandoned condition, or only worked at intervals. Numbers of the latter are good properties, which, if systematically and economically managed, would be remunerative.

Reduction works suited to the treatment of refractory ores of this section must be constructed, but before this is attempted the country will require railway facilities to cheapen the price of labor as well as transportation.

The production of Boise County during 1882 was, approximately, $290,000 in gold and $20,000 in silver.

CUSTER COUNTY.

In Custer County the chief mining districts are found on the Salmon River and its tributaries.

Bay Horse district, in the eastern part of the county, contains some important mines, the best developed of which is the Ramshorn. This is an immense ledge running nearly north and south, on which a number of producing mines are located, the Utah Boy, Post Boy, Mono, Juliet, Vermont, Broadway, Redemption, Silver Bell, and Quincy.

The Ramshorn was the first location, and is situated on the south side of the Ramshorn Mountain, commencing near the summit. It is worked by tunnels to a depth of 800 feet, and the ore improves in quality as well as increases in quantity in the lower levels. The vein is from 2 to 6 feet in width, in a slate formation, and the ore contains chloride, gray copper, lead, and carbonate of iron. It is claimed that the ore can be milled much cheaper than it can be smelted, but hitherto it has been worked at the smelter of the Bay Horse Mining and Smelting Company, with a reported yield of 150 ounces of silver per ton.

The Utah Boy is the first extension south of the Ramshorn, and is owned by the same company. Its production was about $15,000.

The Post Boy is next to the Utah Boy, and is opened by tunnel. During the year operations were confined chiefly to developing the mine, and a large amount of ore is now in sight.

On the Mono work was commenced during the year. No great amount of development was made, but the result is reported as satisfactory.

On the Juliet mine a tunnel has been driven 900 feet and a shaft sunk 135 feet. The ores are quite similar to those found in the Ramshorn.

The Vermont shows gray copper, chloride, &c., and will doubtless prove to be a valuable property.

The Broadway mine is located on Poverty Flat Mountain, and is under lease to Gilbert & Co., who have taken out a fine lot of ore. About 15 tons taken from a 40 foot incline averaged, by smelting, $260 per ton. Operations will be vigorously conducted during the next season.

The other mines on this lode are all similar, the ores being the same in general character and value.

On Ramshorn Mountain, and west of the Ramshorn mine, are located the Excelsior, Beardsley, Hood, Keno, Goodenough, Riverview, and Eagle Rock, on Bay Horse Creek; and Colorado Kid, Uncle Ben, Melrose, and Head Light, on Garden Creek.

The Excelsior is opened by two tunnels of 85 and 125 feet, respectively. From the second or main working tunnel a cross-cut 40 feet in length taps the whole length of the ore-body, which is a high-grade carbonate; average assay of 90 ounces per ton.

The other mines of this group on Bay Horse Creek contain the same character of ore, but not of quite so high a grade.

The group on Garden Creek, about 6 miles west of the town of Challis, are similar to the first-named group. The formation here is lime.

The Kinnikinick mines are represented by the Monitor, owned by Capt. C. B. Rustin; the Overland, owned by J. D. Wood & Co.; the Silver Moon, Lone Star, Ella, and War Eagle, owned by different parties.

The Monitor is being worked by Mr. Powell, formerly of Dry Cañon, Utah, and is showing up in the best manner.

The Squaw Creek mines are principally owned by J. D. Murphy & Co., a New York city firm, Capt. C. B. Rustin, and Messrs. Conover & Gaunt. But little has been done the past season on any of the locations, but what has been done places them on a par with the best in this district. These mines, as also those on Kinnikinick Creek, lie in limestone, the same belt as the Bay Horse and Garden Creek properties.

There are two smelters in operation or ready for work in this district. The Bay Horse Mining and Smelting Company have a 20-ton smelter on Bay Horse Creek, under the management of Mr. A. J. Crook. During the season about 400 tons of base bullion were produced, chiefly from the Ramshorn, Skylark, and Excelsior mines.

The Salmon River Mining and Smelting Company's smelter, situated on the banks of the Salmon River, at Clayton, has a capacity of about 30 tons, but only ran twenty days the past season. The bullion produced was of a good grade.

The mines of this section, taken as a whole, are of a promising character, and will doubtless make large out-turns of bullion; but few sales of mining property have been made, and but little outside capital has been employed in their development, and yet they have been steadily opened, and have made fair returns for the time and labor expended.

Yankee Fork district includes the mines located upon the Yankee Fork, Jordan Creek, and the adjacent mountains, Estes Peak, Norton Hill, and Custer Hill. The principal mining camps are Custer and Bonanza City; the first situated near the junction of Jordan Creek and Yankee Fork, and the latter some 6 miles down the Yankee Fork, near its confluence with West Fork.

The Custer mine is located about half a mile from Custer City, at an altitude of 8,200 feet above sea-level. Here, by an inexplicable freak of nature, seldom witnessed, we find that from that portion of the ledge heretofore worked, by erosion or other causes, the hanging wall has disappeared, leaving the ledge smooth and unbroken, and having the appearance of a vast quarry of quartz on the mountain side. A tunnel has recently been started to tap this immense ore chute at a depth of 250 feet below the surface.

The mine is connected with the mill by a Halladay wire tramway The mill contains 20 stamps, with 10 additional stamps in process of erection. This mill ranks as the best and most convenient silver mill in this Territory, and since its completion, nearly two years ago, with the exception of some six or eight days, while some repairing was being done, the stamps have been dropping on ore from the General Custer mine. The mine and mill are the property of Messrs. Haggin & Greyson, of San Francisco.

The 10 additional stamps are being erected for working custom ores, and will be kept busily employed during the coming season upon ores which cannot be profitably shipped to other markets. The General Custer ores, like most others in the district, are sulphurets of silver, carrying from 10 to 20 per cent. of their value in gold, and are treated by first chloridizing and then amalgamating in the ordinary way.

The Custer mine has produced about $2,000,000 worth of bullion; the last year's production is reported to have been $850,000. The ore producing this amount has all been taken from open cuts, none having been mined by underground work.

The Unknown mine adjoins the Custer on the east, and is a continuation of the same ledge. There are about 600 tons of ore on the dump, awaiting reduction, and a large amount is exposed in the mine. It is the property of the Custer Company and Salt Lake parties.

The Eureka, Continental, and Badger lie eastward from the Unknown.

The Continental is opened in several places and considerable high-grade ore has been extracted. A vein about 2 feet in width is exposed in the deepest workings, which is reported to assay $150 per ton.

The Badger is opened by about 1,800 feet of shafts, &c., and has yielded a large amount of high-grade ore; the production during 1882 was about $30,000.

The Little Giant, Black, Crystal, Threetime-looser, and Bluewing, extend south from the Badger, and are promising ledges, which, however, have been but little developed.

The Lucky Boy and Anna adjoin the Badger on the west. Considerable work has been done, and the ledge is large and well defined. Another season will probably see these mines remunerative.

On the opposite side of the Yankee Fork from the Custer mine, and about a mile distant, is the Charles Dickens mine, situated at an altitude of 7,300 feet, but accessible by a good wagon-road. This mine was discovered as early as 1876, by W. A. Norton, who commenced work in a small and rude way. With two assistants he made an open cut, and the ore taken from it was crushed in hand mortars and yielded a very large sum. The upper tunnel was started in 1877, and the ore extracted was shipped to Salt Lake City. An arrastra was built in 1878, since which time, except a portion of 1881, it has been continuously run.

The lower tunnel is now in about 1,000 feet, and from near the heading a cross-cut of 28 feet strikes the foot wall, along which a level has been run 300 feet. In this level a winze has been sunk 60 feet in very rich ore, containing a considerable amount of wire silver. The upper tunnel is in 384 feet; the ore yields in gold and silver about equal proportions. The richest is found near the walls, the pay streaks varying from a few inches to 2 feet in width. But little stoping has been done, nearly all the ore milled having been taken out in the process of development. This property should be supplied with a first-class mill, and its production would then be somewhat in proportion with its extraordinary richness. The yield during 1882 was reported to this office as having been $80,000.

The Pilot group of mines adjoins the Dickens on the west, and are the property of an Eastern company. The Pilot has been opened by two tunnels, 80 feet in length, and the vein, so far as developed, shows ore similar to that found in the Dickens.

On Jordan Creek there are some fair paying placers, which have doubtless been enriched by the cutting away of the great ledges which cross the stream. Continuous work was carried on during the season by Mr. J. G. Morrison, with good success.

Estes Mountain is about 6 miles from Bonanza City near the source of Jordan Creek.

The principal mine is the Montana. The ledge is from 4 to 12 feet in width, with ore varying from 2 to 6 feet, and is opened by a shaft sunk on the vein to a depth of 500 feet, with levels at a distance from the surface respectively of 50, 100, 150, and 200 feet. The character of the ore is a sulphuret and chloride of silver and gold, about two-thirds of its value being gold. Since its discovery the mine has shipped to Omaha, Salt Lake, the Bay Horse Smelter, and other markets, high-grade ore to the value of a quarter million of dollars. The value of the ore shipped ranged from $500 to $1,200 per ton, and on the dump at the mine are 500 tons of ore having an assay value of $125 per ton. During the past year the production was $60,000.

The Snowbird, Pioneer, Charles Wain, and Cynosure mines lie parallel with the Montana, and about 600 feet distant. These veins are bold and prominent and can be readily traced over the apex of the mountain for about 500 feet. The ore is of the same character as that from the Montana, and while the developments are not extensive yet the mines promise well for the future.

The Tonto lies northwest from the Montana, and has a small but extremely rich chimney of gold ore.

On the east side of Mount Estes rich surface material has also been found.

This section requires more milling and reduction facilities, which, when supplied, cannot fail to attract attention to the district for its large production of bullion.

In the northeastern part of the county is the Pah Simari River, forming a portion of the boundary between Custer and Lemhi Counties. A district has been organized here called the *Blue Wing district*, which bids fair to be an important field. A number of claims have been located, chief of which is the Jones mine. Little development has been made, but the vein shows a width of about 20 inches, the ore being principally milling ore.

All the mining camps of Custer County situated north of the Salmon River procure their supplies from the town of Challis, which, from its location, is destined to be one of the leading towns of Idaho. It is situated in Round Valley, which has a productive area of about 16,000 acres. Timber for charcoal and building purposes is abundant and in close proximity to the chief mines and smelters. In most cases, however, roads must be graded along the base of the mountains to permit supplies to be brought to market.

Ten miles northeast of the Sawtooth mines is *East Fork district*, now in Custer County, though formerly, prior to the revision of the county lines, it was comprised in Alturas County. It derives its name from the East Fork of Salmon River, although the principal group of mines is located on the headwaters of West Pass Creek, a tributary of the East Fork of the Salmon.

The principal mines are the Germania, Arctic, Crœsus, Idaho, Sudenberg, Emerald, and Tyrolese. These mines have all been sufficiently developed to place them upon a paying basis.

The Germania has been worked for about two years, and is opened by a system of tunnels varying in length, the longest being about 100 feet. The ore-body or vein is about 2 feet in width, carrying galena and carbonates. About 10 tons per day have been extracted, which will produce an average of 150 ounces of silver to the ton besides a little gold. No means for reduction of the ore are at hand, and it must find a market by shipment.

The Arctic is an extension of the Germania, and like the latter is opened by tunnels.

The Idaho is perhaps the richest mine in the district. The ores, which are found in two veins, are of galena in one and chlorides and black sulphurets in the other. A tunnel has been run into the galena for about 70 feet. The ore-vein varies much in width where exposed in places, widening out to upwards of 3 feet and then again pinching to but a few inches. The ore assays 150 ounces of gold and silver, chiefly the latter, to the ton.

The Tyrolese is an extension of the Idaho, and is opened by an incline on the principal vein. The ore is even richer than that found in the Idaho, the higher grade assaying as high as 1,000 ounces of silver to the ton. The shipping ore would average about 300 ounces to the ton. There appears to be a permanency to these veins, as development shows them to be gradually widening as depth is attained.

The Emerald is also on Germania Mountain, in close proximity to the Tyrolese. It is but little developed as yet, but during the coming season it will likely be more thoroughly exploited.

West of the foregoing group of mines is Washington Gulch, in which is the Washington mine, which is being advantageously opened by a small force. An open cut has exposed a fair body of galena.

Further up the gulch is the Chloride mine, the ores from which are milling rather than smelting. The mine is being opened by a tunnel to tap the ledge at about 125 feet from the surface. Considerable ore has already been taken out and sacked for shipment to the mill at Vienna. Arrangements were made in the way of erecting cabins and laying in supplies to continue the working of this mine during the winter. The mine is regarded as a valuable property and one that in the near future will make a large production of silver.

A short distance west of the Chloride mine is Champion Basin. The principal mine is the Red Warrior, in which a tunnel about 50 feet in length on the ledge shows about 12 feet of vein material, carrying seams and bunches of ore, some of which is of high grade.

There are a number of other promising mines with more or less development which in time will undoubtedly be well known as producing and paying properties.

The district is well watered and wooded, but to a great extent is inaccessible; the ore shipped to Galena or Vienna is packed upon mules; roads must be built and transportation cheapened before much can be looked for, other than work for development.

The production of Custer County during 1882 was $300,000 in gold and $950,000 in silver.

IDAHO COUNTY.

In this county Mr. N. B. Willey, of Washington, states that there has been but little change in the mining industry since his report of a year ago. There have been no discoveries of new mines of any great extent or richness during the year 1882, but mining operations in old and well-known claims and districts have been prosecuted with unusual vigor and the production of the precious metals has not decreased.

The placer mines have contributed the larger part of the yield of the county, and here, as in other placer mining sections, some claims have been worked out and abandoned, while new ones have been opened. The tendency is to consolidate individual claims and work large bodies of mining ground under strong management, by late methods, improved appliances, and upon a large scale.

Florence district.—Placer mining here has been conducted chiefly by Chinamen, and the production was not materially different from that of a few preceding years and may be estimated to have been $35,000.

The Harpster and Little, a silver-bearing ledge 3 or 4 miles from the town of Florence, which had been opened about fifteen years ago and then abandoned, has been relocated by S. S. Fenn and P. Cleary, who have retimbered the tunnels and done considerable work preparatory to resuming the extraction of ore. It is a well-defined vein, from 2 to 4 feet in width, and the ore assays quite uniformly from $180 to $280 in silver per ton, with a trace of gold. In some respects this mine is extraordinarily well located for working, a survey showing an elevation of 2,048 feet in a lateral distance of about 2,000 feet.

The placers scattered along the Salmon River for a distance of about 50 miles from its mouth have contributed their usual quota of the precious metals. The leading claim is owned by Samuel Large and is located a mile below the mouth of Slate Creek. It comprises about 100 acres of gravel bar varying in depth from 30 to 60 feet. Although it has been worked for upwards of twenty years, but little impression has been made upon it. Preparatory work for operating on a more extensive scale is in progress. A new ditch at a higher level, to carry 1,000 inches of water, is in course of construction, and when completed this claim will take rank as a large producer of gold.

The total yield of the placer mines along Salmon River during the past year was about $50,000, nearly one-third of which may be credited to one claim.

Warren's district.—In this district the yield of precious metals has kept pace with that of former years. Three quartz mines have been in active operation.

The Charity, owned by G. Reibold, has yielded ore from between the second and third levels. It is of a low grade, but exists in considerable quantity and is worked in a 5 stamp mill, situated at the mouth of the tunnel, run by a hurdy-gurdy wheel of 16 feet diameter.

The Tramp, 3 miles west of the town of Washington, yielded 40 tons of ore from an open shaft which paid over $60 per ton. Extensive preparations were being made for opening this mine, but the death of the proprietor suspended operations.

The Knott mine, in the same vicinity, is owned by N. B. Willey, and lies favorably for development by tunnels. The upper tunnel follows the vein at a depth of 60 feet from the surface, and is 370 feet in length. A second tunnel 60 feet below is 180 feet long. Both are in ore and are being extended. A crushing of 222 tons from above the upper drift yielded $2,016 per ton. There yet remain about 200 tons of ore in this level. The second level contains probably about 2,000 tons.

A few small but promising veins have been discovered in different parts of the district, but no work, outside of that required for representation, has been done.

The bullion obtained from the quartz mines of this district is of low grade, the amount of silver contained reducing the value from $16 to $9 per ounce. Aside from this, no silver is produced in the county.

The production of gold by the quartz mines of Warren's district was $11,170.

Placer mining in Warren's is mostly done by Chinamen. Five companies own over a mile of the creek bottom, and employ about 200 men. They have reported the following production:

Took Sing Company	$14,120
Lin Wo Company	21,500
Hung Wo Company	17,400
Wing Wo Company	15,000
Shun Lee Company	11,260
Total	79,280

In addition to this amount other small companies produced $22,500, white men $12,500, and individual Chinamen about $1,000, making the total production of the district $126,450.

The placer mines in the vicinity of Elk City and various smaller camps yielded about $35,000.

The aggregate production of Idaho County is summarized as follows:

Florence district	$35,000
Salmon River mines	50,000
Warren's district:	
Placer	115,280
Quartz	11,170
Elk City and scattering	35,000
Total	246,450

From Mr. Willey's report and other sources of information, I estimate the production of the county in 1882 to have been $240,000 in gold.

LEMHI COUNTY.

Lemhi County, lying along the eastern border of Northern Idaho, is fast becoming known as a region rich in mineral wealth.

For a number of years past, placer mining has been conducted with varying success on the Salmon River and its affluents, but it is comparatively of recent date that attention has been turned to prospecting and developing the vein mines which in the past have enriched the gulches and streams tributary to the Salmon River.

Reports received from this county have been either too meager in detail or too extravagant in predictions to furnish more than general information that can be considered reliable.

Before the revision of the county lines the southern part of Lemhi contained its richest mines, but they have been transferred to Custer County. My report for 1881 described the Mount Estes group of mines as being located in Lemhi County, but more accurate information received in regard to county lines places them in this report where they properly belong.

At Gibbonsville, on Dahlonega Creek, the Idaho Mining Company have been diligently and successfully developing their mines.

Leesburg mining district is about 20 miles west of Salmon City. Gold was discovered here in placers as early as 1866. They were very rich in gold, but were of limited extent and soon were worked out and many of the miners left the county. Others, however, with more faith in the country, remained and commenced placer mining in a systematic manner, opening large tracts of auriferous ground, bringing to their aid hydraulic apparatus. The result is seen in the comparatively large amounts of gold annually washed from the gravel.

Some little prospecting for quartz veins was done and a number of claims located, but from the difficulty experienced in transporting heavy machinery, the country not being accessible by wagons, but little was done until 1881, when parties from Corinne, Utah, secured six of the principal claims, the Golden Terra, Comet, Albion, Golden Rule, Musgrove, and Arnetts, and erected a one-stamp mill to test the ores.

In July of 1882, this property was taken possession of by the Leesburg Mining and Milling Company, incorporated under the laws of Utah. Since then, developments have steadily progressed. Work was commenced upon the Golden Terra and Comet, on the same lode, and located on the divide, between Rapp and Napeas Creeks. The trend of the ledge is nearly north and south, and the dip slightly to the east. Several shafts have been sunk, the deepest being about 75 feet, which at the bottom shows 8 feet in width of vein. The ore assays about $20 per ton, free gold.

The Albion, Golden Rule, and Musgrove are about a mile and a half south of the Golden Terra and across Rapp Creek. These lodes are favorably situated for extracting ore without deep working by shaft and hoisting ore; the hills rise precipitously, and work can be advantageously conducted by tunneling. A tunnel has been driven about 200 feet to cut the Golden Rule.

About 700 feet of work has been done upon the Musgrove and Golden Rule, and the ore mills $40 to the ton. Although transportation of machinery is difficult, the company intend to erect a 10 stamp mill in the spring of 1883. It will have to be taken over the mountains from Salmon City on pack animals.

Mineral Hill district is a new gold bearing section, discovered and located on Salmon River, about 40 miles below Salmon City. Over thirty claims have been taken, and, among other improvements, a stamp-mill is contemplated for the coming season. There is a good wagon-road from Salmon City, and this district will not have to contend against the natural disadvantages which have retarded the development of other rich sections of the country.

In *Taylor* or *Spring Mountain district* a 25-ton smelter is in course of erection by Pease & Taylor. They have upwards of twenty-five mines in various stages of development, the ores from which average 75 to 80 ounces of silver to the ton.

About 8 miles from Taylor district is *Texas district*, where a large number of claims have been located. Little work, however, has been done, but it has been sufficient to show that some of the mines carry high-grade ores. The Viola, on Willow Creek, has been sunk upon to the depth of 120 feet, showing sand carbonates. A smelter is much required for the ores of this section, which are smelting rather than milling ores.

The production of Lemhi County during 1882 was about $180,000 in gold and $30,000 in silver.

OWYHEE COUNTY.

Mining in Owyhee County dates back to the earliest discovery of gold in Idaho.

The Jordan Creek placers were the first worked in the county, and from War Eagle Mountain to Dutch Flat, a distance of about 12 miles, the creeks and gulches were the scene of active mining industry. Almost simultaneous with the discovery of placers, mineral-bearing veins were found in the adjacent mountains, and from the mines of War Eagle and Florida Mountains a large amount of gold was extracted. Many of the best mines subsequently were idle, the companies operating them having become involved through financial disasters in San Francisco; and in many cases the titles to the mines were in litigation.

The county is recovering from the effects of the depression which ensued, but its recovery is slow. Capital to open and properly develop the mines is required before they will again become paying properties, and the country will probably have to be opened by better transportation facilities than it now possesses for capital to engage here in mining ventures.

On *War Eagle Mountain* the Poorman mine, which in times past was second to no mine in Idaho, was operated part of the year and considerable ore extracted, which was worked at the War Eagle mill.

The Glenbrook and Clearbrook mines are situated north of the Poorman; have been worked at intervals for several years. They were leased during the year to A. J. Sands, who has been taking out from the upper levels considerable low-grade ore. It is easily mined, and mills about $30 per ton.

The Silver Chord is located south of the Poorman, was formerly operated by an Eastern company, and subsequently by a San Francisco company with reported success. It was reopened during the year by W. V. Williams and others, who did some prospecting and extracted a small amount of ore.

The Belle Peck mine was also prospected by Sands & Co., with a fair chance of finding another ore-body.

The Ruth mine is west of the Belle Peck, on the ridge. A tunnel has been run on the ledge for nearly 600 feet, some good ore was encountered, but the ore chimney for which they are drifting had not been reached at the close of the year.

At the Richardson mine, northeast of the Poorman, the ledge is small, but the ore is exceptionally rich.

East of the Poorman is the North Empire mine, on which only assessment work has been done.

The Rattling Jack mine, on the ledge known as the Columbia and Oro Fino, has encountered good ore in a drift on the ledge. Much trouble was experienced from a heavy flow of water, and work was abandoned in sinking a winze, which had progressed 25 feet, until machinery could be erected to control the water.

The War Eagle mine is idle and full of water. It had been opened to a depth of over 600 feet and a long chute of ore exposed, none of which has been extracted. Legal proceedings closed operations, and the complications are such that there is no immediate expectation of the mine being reopened.

The Stormy Hill mine is situated south of the War Eagle mine, and is thought to be an extension of the same ledge. A shaft was sunk about 200 feet deep and drifts started both ways. The ledge is of good size and uniform richness. About 130 tons were extracted, 90 of which were milled, with an average yield of about $40 to the ton.

The San Juan mine, east of the War Eagle, was worked under a lease, and some rich ore taken out.

The Whiskey mine is one of the oldest locations on War Eagle Mountain, and the lessees raised some good ore during the season.

The Pauper mine was reopened and considerable work was required to clear out the drift where it had caved in, but the lessees were confident of reaching a rich chimney of ore, the outcrop of which can be seen on the surface.

In the Webster mine the vein is small but very rich; work was steadily prosecuted by the owners, with reported success.

The Golden Chariot mine was in operation for part of the year. Considerable money was expended in prospecting, but the work was near the surface, where former operations had been prosecuted, and no new ore-bodies were found.

The South Chariot was worked under lease with some success. The former operations of this mine, by the company owning it, were without profit.

The Crane and Driggs mine, but a short distance east of the Golden Chariot, was opened by a tunnel which cut the ledge at a considerable depth. In drifting upon it a body of ore of great richness was encountered. The size of it, however, had not been determined.

The Red Jacket mine, which was formerly worked by the Red Jacket Company, was operated under lease, and the lessees took out considerable rich ore that had been left standing in the old workings.

The Lady Washington mine lies northeast of the Red Jacket. A shaft was sunk from where the tunnel cuts the ledge, which ran in rich ore, but little was taken out as the work was for development.

Florida Mountain.—The Empire State mine is on the west side of the mountain, overlooking Blue Gulch. The country rock on the surface is much broken up, but as depth is attained it becomes more solid, and the walls of the ledges in consequence are better defined. A drift is being run on the vein to connect with the old shaft and winze. They are within but a short distance of the winze, and have encountered rich ore in the face of the drift. Stoping will be commenced as soon as the winze is reached, and much good ore will be extracted. A substantial ore-house was erected to store the ore as taken out.

The Black Jack mine is northeast of the Empire State. Fair milling ore was taken out, and from the indications it is supposed that a rich ore-chute had been struck.

The Starlight is north of the Black Jack, and is doubtless on the same vein. A drift is being run with a width of ore in the face of 18 inches of high-grade gold-bearing quartz. In running a cross-cut to tap the ledge, two well-defined veins of low-grade ore were found, one of them being 8 to 10 feet wide.

The Boonville mine, also north of the Black Jack, was worked by A. J. Sands, who also milled the ore taken out.

The Leviathan, south of the Empire State, is worked on a lease. It is supposed to be on the same ledge as the latter. It is an old location and produced considerable ore, which yielded gold of high degree of fineness.

The Walter & Miller mine is on the east side of Florida Mountain, overlooking Silver City. The vein is about 2 feet in width, and a shaft has been sunk upwards of 100 feet; the ledge is well opened with tunnels also. Mill runs of the ore, at the War Eagle mill, were reported as being quite satisfactory.

With the exception of the Golden Chariot, which was worked for a short time by an incorporated company, all the mines of War Eagle and Florida Mountains were operated by private enterprise, and the production during the year was about $165,000 in gold and $50,000 in silver.

At Wagontown, northwest of Silver City, the Webfoot was worked with a small force by Jones & Adams. The ledge has held out in width and better ore was extracted than ever before. A considerable amount of ore is on the dump, awaiting improvement in the condition of the roads in order that it can be hauled to the mill.

The Last Chance is situated near the Webfoot, and is supposed to be on the same vein. A ledge of about 2 feet in width showing good milling ore was exposed in doing assessment work.

The Garfield is a new location, half a mile west of the Webfoot. The ledge is about 18 inches in width, the ore being rich in silver.

On the Wilson ledge a tunnel was run to cut the ledge, but it had not been reached by the close of the year. The vein is large, and yields a low-grade, free-milling ore. The upper tunnel struck the ledge at a depth of 50 feet.

Flint district, southeast of Silver City, is an old mining district, in which many of the principal mines had been abandoned for upwards of ten years. During the past year a number of these mines were relocated and mining operations recommenced.

The Rising Star mine was formerly worked to a depth of 300 feet, with a strong vein and good ore. The Rising Sun Company, which operated the mine some years ago, also ran a tunnel on the ledge, but for some unexplained reason left the ore standing and abandoned their mine. Messrs. Warnkee and Sommercamp, who have been at work during the past year, extracted ore from this tunnel that yields from $100 to $200 per ton.

The Perseverance was never worked by an incorporated company. It has a strong vein, from which considerable good ore has been taken and is now on the dump.

In Twilight Gulch the Twilight mine is regarded as one of the best mines in the district. In early days very rich ore was produced, and the vein is a large one.

The Astor is south of the Twilight, and produces good ore. The owners of this mine have always kept their assessment work up, and the location, in consequence, is one of the few that were not forfeited. The south side is a contact between granite and porphyry. The ledge pitches to the east, and a shaft was started to strike it, but work was stopped before that had been accomplished. The ore is good, and if the mine was properly opened it would pay.

Mammoth district is 4 miles east of Flint district, and was organized about the same time. Its ores resemble those of the latter. They are somewhat refractory, and require roasting.

The Mammoth ledge, which is one of the largest in the country, has been reopened with fair prospects. The ore assays from $10 to $800 to the ton, and the quantity is large, as the ledge is upwards of 40 feet in width.

There are other ledges in this district which when opened up will be likely to prove remunerative.

While the production of Owyhee County was not large during 1882, yet there was a material increase over that for 1881, due not to operations induced by outside capital, but to a greater number of individual operators taking hold of abandoned properties and putting them into the condition of producing mines.

The production of Owyhee County during 1882 was about $200,000 in gold and $230,000 in silver.

WASHINGTON COUNTY.

This county, in Western Idaho, borders upon Baker and Union Counties in Oregon, from which it is separated by the Snake River. For the last two years prospecting has been going on along the eastern side of the Snake River, in what is known as Weiser Country.

Twenty-five miles northwest from Weiser City, and about 4 miles from the Snake River, is *Washington district*, which is about 10 miles long and 3 wide, extending northeast and southwest from Fourth of July Camp to Rock Creek. The formation of the district is porphyry, bearing considerable resemblance to the Comstock district in Nevada.

The principal mines located are the Black Maria, Muldoon, and Daniel Boone. The croppings vary in width from 10 to 50 feet.

The Black Maria has been opened by a 6 by 8 foot shaft, sunk 50 feet on an incline of 40°, all in ore. The ore, of which over 200 tons have been taken out, is free milling, and increases in richness with greater depth. The vein is regular in formation, and can be traced the whole extent of the location. The mine has been bonded to Capt. Henry Guyer, formerly of the Custer mill, and later superintendent of the Philadelphia Company's smelting works at Ketchum. Development work will be continued during the winter, and in the spring a stamp-mill will be erected.

The Daniel Boone has been opened about 35 feet by shaft. The vein is smaller than in the Black Maria, but the ore is richer.

Fifty miles north of Weiser City is *Heath district*, in which the principal lodes are the Belmont, Greenhorn, and Philadelphia. They are all large quartz ledges, carrying silver chlorides with traces of copper.

The Belmont has been worked to a slight extent for several years past with satisfactory results.

Although the mines in this section are situated in Idaho, yet they are tributary to Oregon, as machinery and supplies can be transported from Portland at cheaper rates and with less difficulty than from eastern or southern points. The region is not only rich in mineral wealth but is well timbered and watered, and after the country is opened by railway will be an additional source of wealth to the Territory.

CHAPTER VII.

MONTANA.

Montana produced during the year 1882 $6,920,000 in gold and silver. This is an increase over the production of 1881 of nearly $2,000,000, and was, for the most part, in silver.

The following review of the mines was prepared, as was also that in my report for 1881, by Mr. John W. Eddy, under the direction of Mr. R. B. Harrison, assayer in charge of the Helena assay office, to whom I intrusted the collection of the statistics of Montana. I have, however, reduced in some instances the estimates made by Mr. Eddy, as a careful revision of the reports received at this office, of shipments by express and freight, of smelting works and bankers, shows that in some cases the value of the base metals was included, and, in others, that assay values of shipments were given which were not sustained by actual working returns.

The principal gain has been in Silver Bow County, where are located the mines belonging to several noted companies, such as the Alice, Lexington, Moulton, Silver Bow Mining Company, and others, which have helped to increase the gold and silver product of the county from $2,825,000 in 1881, to $3,740,000 in 1882.

During the year 1882 Montana has been advertised in such a manner as to give a better idea of her exhaustless resources than ever before. The isolation from the outside world which has so long retarded progress and kept the mineral wealth from view is partially broken by the entrance of the Utah and Northern Railroad within the Territory, and already capitalists have in some cases made personal examination of the advantages which have been offered them for judicious investment. With the advent of the Northern Pacific Railroad during the coming year, there is no doubt that there will be incursions of men from the East with capital, who have hitherto only regarded Montana as an inaccessible region in the fastnesses of the great rocky barriers of the Northwest, and it is safe to say that they will see enough to astonish any one who has not kept himself well informed concerning the progress making in the development of its vast mineral ranges. Still, estimates have been made of the possibilities which may be realized by systematic, intelligent, and persistent efforts in a dozen districts in this Territory. One great need is more development, in order that the doors of the rocky treasure-houses may be opened sufficiently to show that there is an abundance of material which may be turned into solid wealth with such appliances as may be readily supplied, and make investors eager to avail themselves of the benefits which the need of their assistance may command.

During 1882 the population of Montana has increased materially. At the beginning of the year the estimated number of inhabitants in the Territory was 46,000. At the recent election for Delegate in Congress the aggregate vote cast was 23,318, which was nearly 9,000 more than that of the previous election in 1880, when the aggregate was between

14,000 and 15,000. By very careful estimates, made of the counties separately, it is found that the average population of the Territory is three times its vote, or in round numbers 70,000 at the beginning of the year 1883.

On the 27th of September, 1882, the county of Dawson, the twelfth in number in Montana, was duly organized, and the town of Glendive designated as the county seat. It covers an area of nearly 22,000 square miles, and lies in the northeast corner of the Territory.

In 1880 the total assessed valuation of property was $18,609,802; in 1881 the aggregate reached $24,060,806.30, and in 1882 the unprecedented amount of $32,211,319.12, which shows in some degree how rapidly the material interests of Montana are expanding. These figures do not represent true values, for mines are not assessed at all; the figures may only show relative values, and do not represent a tithe of the grand aggregate of full property valuations in the Territory.

The rates of taxation in the several counties for the year 1882 were as follows:

	Mills.
Beaverhead	18
Custer	20
Deer Lodge	15
Jefferson	20
Madison	20
Missoula	24
Choteau	15
Dawson	24
Gallatin	14
Lewis & Clarke	17
Meagher	16
Silver Bow	18

The reported increase in the number of cattle in the Territory notwithstanding the unusually large shipments of beeves to the Eastern markets during the year, was 33,970. The importations of sheep during the year were comparatively few, and yet the returns show an increase of over 100,000, or more than 40 per cent. added to the aggregate of 1881.

The receipts of the United States land office at Helena for the lands sold under the various acts of Congress during 1882 amounted to $91,664.68, which is about $6,000 in excess of the previous year, when it was considerably larger than ever before.

There were 185 applications for mineral patents made during the year, covering 3,957.78 acres, and there were final entries made to the extent of 3,815.04 acres during the same period.

Another item indicating growth, is the fact that the registered letters and parcels transmitted through the mails of the Territory during the last fiscal year numbered 51,310, being an increase of nearly 13,000 as compared with the year 1881.

BEAVER HEAD COUNTY.

The Argenta district is, next to Bannack, the oldest quartz camp in Montana Territory. The first smelter erected in the Territory was built at this point by the Saint Louis and Montana Mining Company, of which S. T. Hauser, now the president of the First National Bank of Helena, was at the head. There has been very little systematic mining done recently, only the desultory work of prospectors and claim owners in the district.

During the past season Mr. E. Ball has picked up little lots of ore from the dumps of the various mines and made about a thirty days' run with the old Tootle furnace, and produced about 40 tons of lead bullion, which carried 200 ounces of silver to the ton and some gold. One shipment of about 200 tons of ore, taken from the Legal Tender mine by Mr. C. Bray, was made recently, which sampled 250 ounces silver to the ton and 67 per cent. lead.

The number of ounces of silver produced from all sources in this district last year was about 15,000, and of lead about 70 tons. Gold from W. Ravesseroft's placer, $2,000. The ores of this district are soft, and as a rule belong to the class known as smelting ores, and the work lately done there has been successful and profitable to the parties interested.

The *Bannack district*, like the Argenta, has been worked to little purpose except to make tests and examinations of mines with reference to future sales and transfers. There are probably more mines now under bond in Beaver Head County than in any other county of Montana, and it is believed that many sales will be made on or before the opening of another season. The 6-stamp mill on Grasshopper Creek is the only one of any kind in Bannack, although there are locations almost numberless in that locality, and many of them are acknowledged to be exceedingly valuable properties. Rattlesnake Gulch has been mined during the past season, and probably not less than $35,000 of gold realized. Some work has been done in the old Rochester district, also on Camp Creek, where about $5,000 came from the placers. Moose Creek, Fish Creek, and Highland Gulch have done nearly as well as during the previous season, and may be credited with $12,000 gold.

The *Blue Wing district*, near the Bannack, is in much the same condition as at the opening of the season. Titles have been secured to the waiting properties, and some have been developed to such an extent as in some to give good assurance of value and permanency, but until reduction works are secured this region will be comparatively quiet.

The Only Chance Mining Company of New York have a Huntington mill, a steam-hoist, and such appliances as were considered requisite for the treatment of the ores of their Only Chance mine, of Red Mountain, but the results have not been as good as were expected. Large expenditures have been made, considerable of which were at least injudicious. The mine is deep, and located on a high mountain, and as it was determined to place the mill on the mine, water had to be brought in pipes a very long distance, and economy in the management seems to be wanting.

The Hecla Consolidated Mining Company of Glendale has been one of the most successfully operated companies in the Territory. Their mines display an almost incalculable quantity of ore, and their works are kept in operation to their full capacity. The plant has been established on a basis of economic working rarely found, and results prove it to be one of the best within our borders. The gross product of this company for the first nine months of 1882 was $694,200, or over $900,000 for the year, which represented about 500,000 ounces of fine silver, besides the lead and copper. Monthly dividends of one per cent. on its capital stock of $1,500,000 have been paid during six or seven months of the year.

The Nevins mine has been worked on a lease, with about the usual results.

Outside of the placers of this county there has been some increase in the product of precious metals during the past year, but the grand total for the county cannot be placed above $700,000, although the yield for last year was stated at $950,000, exclusive of lead and copper in the bullion.

CHOTEAU, CUSTER, AND DAWSON COUNTIES.

Discoveries of mineral have been made in parts of Choteau County, which are untenable by white men, owing to the depredations of Indians, but, so far as is known, no systematic attempts have yet been made to prove their value, nor is there any probability that there will be while so large a proportion of the county is held under reservation.

Work having been begun on the eastern border of Custer County at Boulder River, it is not unlikely that another year will see some yield of the precious metals from this county, in which they are known to exist.

Dawson has been organized only since September 27, 1882, and but little is known of its resources.

All these counties are underlaid with an abundance of coal, much of which, however, is of the poorer grade of the bituminous variety, and ranks only as lignite.

The Gray Rock mine, which produced last year from 50 to 60 tons of good ore per day, has been engaged in development work, but furnished no ore for treatment. A new shaft was sunk 130 feet deep, and a crosscut started which struck a fine body of ore.

DEER LODGE COUNTY.

The yield of gold from the placers of this county was fully as large, on an average, as in 1881. The season's supply of water was somewhat better, and the supply of labor fully as good as in the previous year, and the ground worked covered an area as great. Owing to the change going on in the methods of transportation in Montana, some of the product takes different directions to market, as, for instance, during 1881, Messrs. Donnell, Clark & Larabie, of Deer Lodge City, bought dust and bullion amounting to about $230,000, while in 1882 the amount shipped by them was only $146,000 dust and $30,000 bullion, but their house in Butte was a large buyer of dust this year, which, when it is remembered that the railroad had reached Butte early in the season, needs no further accounting for the fact. A large proportion of the gold bought by them came from Pioneer and its vicinity, where the product was fully equal to that of 1881, or about $200,000. No account of any of the gold taken by the Pioneer Company, one of the oldest and largest operating in that region, appears in any of the banks, as the season's product is shipped directly to the New York assay office.

One or two China companies are known to be making a great deal of money in this camp, and their chief aim seems to be to keep their product out of sight. They never acknowledge making more than about "enough to cover expenses," but are known to be working some of the richest bars of this extensive and rich camp.

Some new discoveries of quartz lodes have been made in the vicinity of Bear Gulch during the past season. One known as the Cato, discovered by James Gloster, the same who discovered the Gloster mine of the Boston and Montana Company, near Helena, displays a very rich, medium-width vein of gold ore. Some of the locations on the great vein which extends along the divide between Bear and Elk Gulches have been worked and an increased amount of gold ore thrown in sight, but the quantity milled has been so inconsiderable as to add little to the gold output of the Territory from that source.

The yield of the placers of Bear and vicinity have aggregated about as follows:

Bear Gulch	$50,000
Elk Gulch	45,000
Other gulches	75,000
Total	170,000

J. Abascal claims to have realized during 1882 very nearly $75,000 in gold out of the various locations in which he has an interest in this region. He is the fortunate owner of nearly all the available water for use in those mines.

The other placers of this county have yielded about as follows:

Ophir Gulch	$10,000
Upper Ophir	12,000
Carpenter's Bar	18,000
Carpenter's Bar Gulch	5,000
Ohio Gulch, P. Hanley	1,000
West Illinois Gulch, Hill & Emerson	1,500
Three Mile, Jordan Brothers	800
Snow Shoe, Anderson & Others	3,000
Washington Gulch, three companies	5,000
Jefferson Gulch, C. G. Birdseye	6,000
California Gulch, H. C. Keye & Co	6,000
Nevada Gulch, Dan Sprankel	2,000
Lower Ophir Gulch, four companies	8,000
Other places tributary	5,000
German Gulch	8,000
Henderson Gulch	16,500
Total	107,800

Mr. C. G. Birdseye, a merchant of Blackfoot City, in the vicinity of Ophir Bar, received in the way of trade from miners of that vicinity gold dust amounting to $16,604.64 during the past season.

The Cable mine at Cable City is one of the richest gold mines in the Territory. The lode is exceptionally wide, and its product as free as any found. Owing to long and tedious litigation, the property remained idle for years, but during the last season a 30-stamp mill of the most approved pattern has been built and work prosecuted with unusual vigor. J. C. Savery, who is personally in charge of the property, has steadily refused to report the progress making, but William Nowlan, who is also a party interested, and who was once the sole owner of the mine, and has spent the season there, says that the gold produced will not amount to less than $150,000.

The mine at Georgetown, named after its owner, Cameron, has been steadily producing. The yield from its 6-stamp mill has been about $1,500 gold for every fortnightly clean-up, or, say, $30,000 for the year.

The Hope Company's mine has yielded, under the skillful management of F. L. Perkins, $361,000 in silver during the past year. Their 10-stamp mill is supplemented with Frue vanners, and saves a fair percentage of the silver.

Granite Mountain.—Work on this property was suspended last fall, but Superintendent Perkins, of the Hope, received orders to run the third tunnel, a new one, in 1,000 feet. Two shifts of men are working, and the vein shows up better than ever. This mine has in sight quartz running from 30 ounces up.

Of the Algonquin and Trout mines little can be said, except that preparations are making to work these properties again, the latter mine to be stocked with new hoisting machinery by Caplice & Brother, who hold it under lease.

The Providence Mining Company, recently organized upon a mine of the same name, in Lincoln Gulch, has erected an arrastra to test the quartz, and since that built a 10-stamp mill to run by water-power. About $1,000 was saved by the arrastra, and the mill runs are expected to begin some time during January, 1883. James M. Blake, president.

The total yield of the county for 1882 in silver and gold was fully $720,000.

GALLATIN COUNTY.

Since the ratification of the treaty made with the Crow Indians, that part of their reservation which included the Clark's Fork mines is now comprised within the limits of this county.

While the first operations inaugurated in that locality were not in any degree satisfactory, later developments have proved that good grades of ore can be secured in abundance. The first smelting done was principally from the great bowlders of galena found upon the surface, and which happened to carry very little silver. As the lodes were opened and ores extracted from below the surface, it was found that many were exceptionally rich, and the fact is now established beyond question that the New World district will develop into importance as a mineral-producing region in the history of Montana.

The smelter, built by the Eastern Montana Mining and Smelting Company, has been renovated, and during the latter part of the season of 1882 did some successful work in reducing the ores taken from the lodes which produce those of good grade.

Among the best known and most promising lodes of that region are the Great Republic and the Black Warrior, the former being the widest and most regular, but the latter carrying the highest grade of product. The requisite fluxes for the smelting of ores are found there in abundance, and the percentage of lead desirable can be found in almost any of the ores extracted from the mines to the depth reached in the present stage of development.

The placers found in *Emigrant* have doubtless produced more gold than any of the other gulches worked in this county. Of late years the amount realized has not been large, but there is no falling off in the returns. Three parties worked in that gulch during the last season, and from the most reliable information at command the aggregate clean-ups will not be less than $12,000. Some have estimated the amount realized from that locality during 1882 at not less than $30,000.

Bear and Crevice Gulches have also been worked to a limited extent, and Brown's arrastra has continued to add its quota of gold to the general yield, from ores supplied by the narrow but rich gold lodes of Bear and Crevice Mountains, where there are about fifty recorded locations.

Placer mining has been done on the Boulder, which is now the boundary of the Indian reservation, and many quartz locations have also been made, but until there are better facilities at command for the successful treatment of the ores produced, the bullion yield of Gallatin County will remain insignificant in comparison with the acknowledged resources which it has developed.

Without estimating the lead value in the bullion, the yield of the county in gold and silver during 1882 was not less than $30,000.

JEFFERSON COUNTY.

The most important factors in the year's work in this county have been the reduction works at Wicks and Gregory. At the latter place very little ore has been purchased from outside mines, as the company's property has been capable of fully meeting the demands of their works. During the latter part of the year the roasting facilities have been increased to such an extent as to keep the smelter supplied for much longer runs than the former average, and the bullion product of 1883 is expected to be considerably larger than for the past year.

The aggregate of production of gold and silver at this plant for 1882 was $245,000, of which about $65,000 was gold.

The mines are opened to a depth of 350 feet in the East and Consolidated Gregory, and connecting levels completed. The ore reserves in these mines are abundant, and the output is said to carry from 50 to 60 ounces of silver per ton, besides very nearly half an ounce of gold.

During a large part of the year the concentrator used largely of the second-grade ores that were on the dump of the Old Consolidated mine, and there is still left an immense quantity of the cullings out of which shipping ore was formerly selected.

The Alta Montana Company's mines improve with development. As depth is gained the ores of the Alta mine assume more decided characteristics. Instead of being mixed so intimately as to render hand sorting even difficult, as formerly, the galena is to a large extent by itself, and the siliceous ores are more decidedly dry. The Comet, owned by this company, is now 225 feet deep, and the ore-body is as compact and large as ever in the history of this excellent mine. The very large percentage of lead in the Comet ores has supplemented the product from the Alta in such a manner as to materially assist in the manipulation of the smelting department. There is no doubt that a large per cent. of the Alta output carries so little lead as to render it possible to work it by the dry-milling process much more economically than by smelting. The concentrator at the reduction works has not been successful in treating the Alta ores, owing to the intimate mixture of the silica and the fine particles of galena. The concentrator at the Comet has little work to do on the ore from the deeper portion of the mine, and the surface carbonates are difficult to save in it. A part of the Comet output is successfully concentrated, but the richest ore from this mine is the solid galena now taken from the lowest level.

A large part of the year's product of fine silver in the 15-stamp mill of the Alta Montana Company has been run into the lead-bullion product through the smelter, and, consequently, has not been sent to the United States assay office at Helena, as formerly. The product of this plant for the year has amounted to $64,113.56 in fine silver, treated at the assay office, and $325,000 in lead bullion, the latter estimated.

The A. M. Holter mine, in the *Elkhorn district*, in the Crow Range of mountains, has been idle during a large part of the past year, owing to a disagreement among the owners. It is without doubt capable of yielding large returns for judicious investment, under good management, and it is expected that its present 5-stamp mill will be supplemented with roasting facilities during 1883. Fine silver to the amount of $4,285.03 was produced at the mill during the last year.

The placer mines of this county have in some cases yielded considerably more than during the previous year, but in one or two localities no work has been done.

From Basin Gulch the product has amounted to $16,000, taken out by Parkes & Winters.

The Indian Creek placers have yielded as follows:

Tandy & Co	$4,650
William Hamilton	3,000

Pat Bowen & Co	$5,000
S. Collier & Co	5,500
O'Neill & Co	6,500
John Murray	7,000
Total	31,650

From Clancy Creek and Lump Gulch	2,000
From Boulder, by J. T. Smith & Co	2,700
Taylor & Co	5,000
From Mitchell Gulch	10,000
From bar near Indian Creek, by Murphy, Neel & Co	3,500
Holmes & Co.'s placer	600
John Barny	1,200
Other mines in the vicinity	3,000
Little Giant quartz mine	10,000

Very little work has been done in the *Cataract district*, comparatively, during the year 1882. The Retort Company has run a tunnel for a long distance, with the intention of striking the Boulder lode at a point which should not only drain it, but enable it to secure a large amount of stoping ground; but the long distance contemplated, 1,100 feet, after a large outlay, has finally discouraged the promoters of the enterprise, and for the present the property is idle. The 10-stamp mill owned by the company has worked considerable surface-gold quartz from the adjacent mines, and is credited with producing $10,000 of gold during the year.

The Highland mine is in the immediate vicinity, and is being worked for its owner, C. E. Kemp, of Helena, by James H. Conley. A test of 30 tons of the surface product of this mine was run through the 10-stamp mill of the Retort Mining Company; netted a saving of $20 gold per ton. Mr. Conley is sinking a 50-foot shaft on the vein. The ore is thus far free, and the lode is about 6 feet wide.

C. K. Riale is sinking a 100-foot shaft on the Buckeye lode, which adjoins the Overland. An assay was recently made from a sample of 50 pounds of ore, in which were included all kinds of the rock which carried any pay, and the result was found to be $11 gold and $40 silver per ton.

During the year a mill has been put up on the Amazon mine of the Boulder district by Mr. Nave. The ore in this mine is a mixture of red oxide of iron, carrying a fair quantity of gold, and a soft, sometimes partially decomposed, galena, bearing silver, and the mill was of the character designed to treat free ores. Recently changes have been made to adapt it to the kind of ores produced, and the results have been a yield of $3,000.

The total yield of Jefferson County for 1882 was not less than $45,000, exclusive of lead in the base bullion.

LEWIS AND CLARKE COUNTY.

Within the limits of the city of Helena, the capital and chief city of the Territory, placer mining is still prosecuted to some extent. A bed-rock flume from the valley has reached a point which drains some of the valuable deposits in the lower portion of the city, and gold dust to the amount of $20,000 has been marketed from that point. In the immediate vicinity gold was taken from Tucker and Dry Gulches by R. S. Hale and A. Foote, amounting to $10,307.21 and $3,000, respectively.

At Park City, 5 miles above Helena, gold dust was marketed somewhat in excess of 1881, aggregating about $19,000.

At Unionville:	
H. C. Carpenter	$3,500
Phil. Constans	650
From Basin Gulch, by—	
Dingeet & Co	3,200
Halford & Co	9,500
Brown & Co	1,150
From Ten Mile, by—	
Travis Brothers	2,000
A. Head	1,400
From Try Again, by Travis & Son	2,780
From Monitor, by John D. Brayman	1,300
From Eureka, by Washington Jones	00
From Lower Basin	500
From Silver Creek, by Sanders & Hopps, Vestel, Trent & Rumping, and Hop Te Tong Co	15,000

New ground will be opened next year, when the yield will be considerably increased.

From Saint Louis Gulch, by Ed. Delaney	$10,000
From Greenhorn Gulch, by—	
H. D. Evans	2,500
Others	2,000

The waters of nearly all these gulches are tributary to Ten Mile, and enter the Missouri River within 13 miles of Helena.

In the vicinity of Park City there are several lodes of good promise, including the old Whitlach-Union, which has produced over four and a half millions of gold; but only a limited quantity of work has been done there during the year. Tributers have probably realized out of the Whitlach-Union not less than $12,000 during the year, and the mills of this place and Park City have added a small quantity to the general aggregate, probably not over $6,000.

In the district known as *Ten Mile*, about 15 miles southwest from Helena, there has been unusual activity during the past summer. A group of seven locations, viz, Lee Mountain, Extension, B. W. Field, Clontarf, Wolf Tone, Lady Meagher, and Young Ireland, all of which were located under the old law, and cover 2,200 feet each along the vein, were bonded by a syndicate of Eastern capitalists, who actually expended about $30,000 in making such developments of these properties as would thoroughly test their value, and it was claimed that the results were entirely satisfactory to the parties most nearly concerned. Prominent men were identified with this enterprise, and the general belief was entertained that Ten Mile would soon become the peer of Butte in its display of mineral resources. Important works were contemplated, including a 40-stamp mill and a smelter, and water concentrator. For some reason not apparent, or inherent in the property itself, the project seems for the present to be abandoned, and this district is advanced only to the extent of the work done in development.

The above-named group of mines is on Lee Mountain, which is on the left bank of Ten Mile, the stream from which the district now takes its name.

Within a short distance from Lee Mountain is the Russell group of mines, which includes eighteen different locations, some of which have been extensively developed, and display large bodies of good-grade ore. Of these locations, four of the most prominent and promising ones have been bonded by the same syndicate as operated on Lee Mountain, and merged with the seven properties first mentioned. On the vein called the O. H. Bassett there are seven openings, which by simply counting the width of the shaft and actual exposures of ore aggregates 200 feet of pay ore in sight, and for a distance of 1,632 feet the lode has been traced by means of these cuts. The average assay of the ore reported on the test made was 93 ounces of silver per ton.

Between the North and South Pacific locations, which are on the same lode, is a shaft 122 feet deep, and the ore has been worked out for a distance of 115 feet along the vein on either side down to the depth of about 65 feet, leaving one body of reserves measuring 56.6 feet in depth and 115 feet along the vein of the South Pacific, entirely bounded by shafts and a tunnel, besides a large exposure of reserves left in the 115-foot level in the North Pacific.

The American Flag, which lies mostly within the South Pacific ground, has 130 feet of the ore actually exposed along the vein, which averages 4 feet in width and assays 90 ounces of silver per ton. The tunnel, 271 feet long, so connects with shafts as to bound an ore-body that is estimated to amount to at least 5,000 tons.

The ore in sight in the South Pacific is estimated at an equal amount, and a fair showing for the Bassett would give it credit for not less than 2,500 tons, while there are now on the dump of the South Pacific and American Flag not less than 2,500 tons of ore, out of which the first grade has been assorted and shipped away, leaving a product which is still said to average 62 ounces of silver per ton. The shipments of ore from the South Pacific have aggregated about 1,000 tons, and the assays have run from 133 to 380 ounces of silver per ton.

The Little Jenny, about 5 miles beyond the Russell mines southward, has been worked only a part of the year. The output has aggregated for the year $15,000. Nearly all the ore produced was sold to the Alta Montana Company's reduction works.

On Providence Hill, a short distance easterly from the Little Jenny, are the well-known Nellie Grant, General Grant, General Sherman, and Good Friday lodes. Of these the two former have been worked during the past year.

The Nellie Grant has been capitalized and stock sold among the residents of its vicinity to such an extent as to enable its owners to develop it sufficiently to establish its claim to rank among the mines that will pay to work. A hoisting engine, formerly used on the Bonanza Chief, is now owned by the company, and the property is being systematically opened to show what its capabilities are. About $4,200 have been produced at this mine from sales of ores to the Alta Montana Company.

A large body of rich ore was accidentally uncovered on the General Grant lode while making a road across the location, over which the hoist was to be taken for the Nellie Grant. The grade of ore taken from the new opening on the General Grant proves to be richer than that found in the large pay chute of the adjoining mine, the assays showing a valuation of 90 ounces per ton in silver, while the Nellie Grant carries only about 60, but the vein in the latter mine is exceptionally wide and strong and pretty evenly mineralized.

First in importance among the mining transactions in this county during the last year is the sale of the Drum Lumon mine. English capitalists have contracted to pay for this property $625,000 in cash and $875,000 in stock of the company to be formed upon it, the capitalization of which is to be limited to $2,500,000. The erection of a 40-stamp mill, with all the necessary appliances for treating refractory ores, is contemplated as soon as the season will permit.

The Drum Lumon was discovered by Thomas Cruse eight years ago, but none of the ore was milled until 1880, when the present 5-stamp mill was erected. The mill results have shown a saving of about $45 per ton, which it is claimed is the average richness of the ore for the entire width of the vein, which measures 80 feet. The assay value of the ore is claimed to be about $100 per ton, not half of which is saved in the little mill.

The main shaft of this mine is 150 feet deep, and is connected with a 360-foot tunnel at the bottom. Levels have been run 200 feet each way from the shaft along the vein, and at a distance of 35 feet from the shaft a cross-cut shows the vein to be 80 feet wide. On the opposite side of the shaft cross-cuts have been run, one at 75 feet of depth and one at 150, the former for a distance of 56 feet and the latter 80 feet, without encountering walls in either case. Wherever development has been done on this remarkable property good pay has been found. It is claimed that there are over 200,000 tons of ore now "in sight," all of which is good pay. Results in the 5-stamp mill have been meager, owing to the fact that the deeper ores are refractory, the saving amounting to $30,000.

A test of the ore taken from the deepest shaft of the Monarch of the North, adjoining the Drum Lumon, assayed at the United States assay office at Helena, resulted in 75.83 ounces of silver and $42.17 in gold per ton, and the sample taken consisted of the entire product of 4 feet of the width of the pay streak of the mine, carefully measured. This lode seems to point towards the shaft of the Drum Lumon, and the Empire and North Star, on the east, also converge towards the same point. At least three large and rich lodes unite and make one grand pay chute within the Drum Lumon location.

The Nine Hour lode, just south from this, has a shaft down 50 feet, and the show for a paying mine is considered very good. This vein seems to point towards the main shaft of the Drum Lumon from the south, as the Monarch of the North does from the north; and lying in the same line as the Nine Hour, Drum Lumon, Monarch of the North, and Last Hope, which are on the same great lode, is the Jay Gould, still farther north. It is 105 feet between walls, and presents many of the same general features as are characteristic of the now famous Drum Lumon. It is only slightly developed, the work done hitherto having been with reference to a determination of its course and size, and hence the shafts upon it are shallow—mere "discovery holes."

The Hesperus, in the same vicinity, owned by Randall H. Kemp, is developed by a shaft 23 feet deep at discovery, and another 12 feet deep. A test run of the ore from this property netted a saving of over $16 gold per ton, in an arrastra. The pay streak is 3 feet thick.

There are about thirty locations on what is known as Cruse Mountain, and as many more on Belmont Hill, half a mile distant.

The Belmont Company owns a 30-stamp mill, which was operated during the early part of the year, and about $20,000 gold realized from the ore of the Belmont mine. This mine contains a large quantity of ore, which carries about $10 in gold to the ton, but it is in such a position as to render the expenditure of considerable money necessary before it could be taken from the mine with sufficient economy to leave a profit over the cost of working, and as a consequence the mill is idle until some arrangement can be made for the requisite development of the mine.

The Hickey and Bluebird mines, a mile and a half above the Belmont, on Silver Creek, are now 220 feet deep, and the walls of the mines are from 6 to 15 feet apart. Where the pay streak was narrow the ore netted in their 10-stamp mill about $30 per ton, but the present workings net a saving of $22 gold per ton of ore milled. The year's work has realized for Messrs. Cotter, Hickey & Tierney, the owners, $60,000.

Within about a mile of the Hickey and Bluebird are the Albion and its associate mines, owned by Messrs. Chadwick, Chamasero & Tatem. The product of this property was worked during the early part of the season in the single-stamp mill invented by S. Sharpneck, and operated by direct action of steam. The quantity milled daily averaged about 7 tons, and the saving considered as satisfactory as was realized in the Cotter & Hickey 10-stamp mill, where tests were made with the same ore; six months' product amounted to $13,369.03 gold.

The Parker & Griff locations are near the Penobscot mine and give promise of becoming very valuable. A test run was made through the 1-stamp mill, and resulted in $26.32 gold saved per ton. The quantity of ore treated amounted to 57 tons. B. C. Brooke, Alexander Elgie, and Matt Wormer, owners.

The Whippoorwill mine, owned by Vestel & Lahey, is about 2 miles westerly from the Belmont. During the year their 10-stamp mill has turned out $10,000 worth of gold bullion.

The M. L. mine lies a few hundred feet southwest from the Whippoorwill. It is owned and worked by Lane & Lynch. From 70 tons of their ore run through a one-tub arrastra, $1,500 was cleaned up in gold.

The Boston and Montana Company's Gloster mine is about one mile east of the Whippoorwill. This company owns two mills, one of 60 stamps and one of 20, equipped with every modern appliance for the reduction of free-gold ores. The large mill has been in operation a little less than a year. The net product of the two mills for 1882 was $290,572.88 in gold. The 60-stamp mill is built on a solid rock-reef and is 116 feet long. The shaft-house at the mine is 100 by 32 feet, the carpenter's shop 100 by 20, and the boiler-room 36 by 40 feet in extent, and all under one cover. The ore from the mine is carried by a T-rail tramway to the large mill and into the 20-stamp mill by a tunnel which connects with the 120-foot level. At the head of the tramway an ore-bin of 1,000 tons capacity has just been completed, and will be filled for use in any emergency which may arise from an accident to the hoisting works. The Gloster mine is developed by a three-compartment shaft to a depth of 300 feet, and at each 100 feet levels have been run, for a distance of 150 feet each way, from the shaft at bottom, and in the upper works, for a distance of 600 feet wide along the vein. The vein is nearly 20 feet in the widest places, and all the product between walls goes unassorted into the mills. L. R. Nettre, manager, and H. W. Child, assistant.

Piegan Gulch has not been worked during the past year, nor has Trinity, Mr. Jacobs having sold his water right and ditch to ranchmen for purposes of irrigation.

Virginia Creek, a branch of Cañon Creek, has been worked by A. G. Clarke, the owner, and $8,000 gold taken out.

From the Homestake mine, upon which Stemple & Knight erected a 5-stamp mill, $4,000 was taken last summer, and from the Grabstake, the adjoining location on the same lode, owned by Milo Courtright, Geo. Richards, Frank Proctor, and Johnson, from a run of 260 tons of ore through the same mill, $14,988 in gold was saved. Another run of the same yield, aggregates the results of the year.

The yield of the placers along the Missouri River aggregate about the same as last year in this county, or, including French Bar, $10,000.

The shipments of the Pacific Express Company from Helena, during 1882, amounted to—

Gold	$646,699 02
Silver	88,035 00
Total	734,734 02

The gold bars made at the United States assay office in Helena during 1882 amounted to	678,925 33
And the silver amounted to	91,013 16
Total	769,938 49

The total yield of gold and silver in the county for 1882 will not amount to less than $425,000, almost all of which is gold.

MADISON COUNTY.

The principal yield of gold in this county is from the famous Alder Gulch, the history of which is as widely known as that of any mining district among the Rocky Mountains. One-half of the entire amount of gold produced in Montana, since the first discovery in 1861, is credited to Alder.

The product of this locality will fall short of the realizations of the previous year by about $50,000.

A very large flume has been completed, and had a short run, but did not operate long enough to add much to the season's product, but promises to much more than compensate next year for the deficit caused during 1882. Messrs. E. W. Knight, of Helena, Raymond & Harrington and Charles L. Dahler, of Virginia City, and P. Largey, of Butte, are the promoters of this enterprise.

Henry Elling, one of the bankers of Virginia City, bought gold, mostly in the form of dust, during 1882, aggregating 9,146.25 ounces, for which he paid $138,773.61. Mr. Elling, from his connection with many of the largest producers, secures the principal portion of the product, but Raymond, Harrington & Co., bankers, have also purchased largely, nearly equaling the amount of the year previous.

Besides Alder Gulch proper, which is now worked for a distance of 14 miles, Bevins Gulch, a tributary entering it near Virginia City, also Brown's Gulch, has been mined, and Washington Bar, at the headwaters of Meadow Creek, east of the Madison range of mountains and north of Pony; Upper Hot Spring Creek, near the head of the range; Barton Gulch, which enters Alder at the head of the lower cañon, and Norwegian Gulch have all added their quota to the quantity of placer gold taken from the mines of this county, and, as a rule, the season's production has amounted to more than that of the previous year, excepting in Alder Gulch, where operations were for a time somewhat interfered with on account of the work done on the new flume.

The great and pressing need of the region about Virginia City is adequate reduction works. From the returns received from shipments of ores to Omaha, Butte, and Glendale, there is no doubt whatever that the mines of that vicinity will become extensive producers as soon as circumstances shall render it possible to extract the precious metals from their ores at any reasonable cost. At present the rates of transportation are sufficient to place an effectual embargo upon the shipment of any but the very richest grades of ore, and it is on this account that so many lodes of excellent promise are to-day idle in that region.

The only ones worked at present to any extent are the Prospect and the U. S. Grant, both in the immediate vicinity of Virginia City. There is little to note in their present condition as contrasting with it a year ago, except that new ground has been opened of the same rich character, and to that extent the permanency of the veins assured. Enough has been realized out of the shipments of ore from the Prospect mine to reimburse its owners fully for all outlay in its development, and the shipments made from the U. S. Grant have resulted in a large margin of profit, but the average of pay left on the dump is reduced by this selection and shipment of the best grades.

The Red Bluff mine is located about 35 miles northeast from Virginia City, and is owned solely by Hon. H. N. Blake. A tunnel has been run 400 feet and the lode intersected by it at a depth of 160 feet, where the walls are from 5 to 6 feet apart. One pay streak, 18 inches thick, assays $118 in gold and $10 silver per ton, and another, 12 inches thick, carries $78 in gold and $20 in silver, and whole lode averages from $30 to $40, gold, and $20, silver, per ton. In running the tunnel another vein was found and located under the name of the Red Bluff north. In this the pay streak is from 12 to 15 inches thick and carries $63, gold, and a trace of silver, $1 to $2 per ton. In December Judge Blake refused $20,000 cash for this mine, and is now asked his price by parties in Chicago.

The *Pony district* shows more activity than any other quartz district of the county. Henry Elling, who owns larger interests in this district than any other individual, is doing much of the development. He is running a tunnel to strike the Elephant lode at a depth of 50 feet, when its supply of surface product will be available for milling purposes. The vein is in some places 50 feet wide, and assays range from $3 to $42, gold, per ton.

The Strawberry lode is from 5 to 10 feet in width and carries a low-grade of ore, averaging from $10 to $12, gold, per ton. A tunnel into this property has reached a distance of 300 feet, and it is expected will soon reach the lode, when the extraction of the ore will be accomplished with ease and economy.

The Ned displays a pay streak of 5 feet in one of the levels now running, and from 6 inches to 3½ feet in another, the ore carrying from $25 to $425 per ton in gold and silver, and it is claimed that there is fully $100,000 now "in sight" in this mine.

The Willow Creek is developed by three tunnels, the lower one being 200 feet from the surface and 400 feet long. The ore is of the same excellent quality as the Ned, and the pay streak is from 5 to 10 feet wide. Mr. Elling is now taking out nearly 50 tons of ore a day from this mine, with only four men in the stopes. The 10 stamp mill upon this property treats the free gold-bearing surface product with a satisfactory yield of profit.

The Boss Tweed, owned by Elling, Morris, and others, is 35 feet wide and carries base ores, from which it is practicable to select a grade that assays as high as $75 per ton.

The White Pine, owned by Thomas Carmin, is wide and strong and claimed to be a "bonanza," and has already added something to the gold product of Madison County. From the first run of 100 tons of its ores, by the simple gold process, in the Elling mill, gold retort weighing 177 ounces was secured, which was valued at something over $2,000.

Doubtless other lodes will make as good records for themselves upon the requisite amount of development to determine their character, and it is only reasonable to expect good results from extended operations in a camp where the structure of the lodes is so régular and the pay so uniform as is found in Pony.

There are two mills in the district, one of 5 and the other of 15 stamps, but for two years they have been most of the time idle.

Mr. Elling is now erecting a 20-stamp mill at Pony, with a concentrator and all the appliances necessary for the proper manipulation of the ores of that district. Mr. J. T. Gove, of Salt Lake City, is managing the work of Mr. Elling, and he is so confident of large and satisfactory results that he has promised to send to Virginia City a $50,000 gold brick as the proceeds of his first run of the new mill in the coming spring.

The ores of this district carry very little silver, the product being almost entirely gold.

D. B. Noble & Sons, of Upper Wisconsin Creek, have continued to work the Company lode with about the same results as before.

The London Company, located at Silver Star, operated their 40-stamp mill on ores from the Broadway mine for a little over three months in the early part of 1882, until the product was found to be so refractory as not to work at sufficient economy to pay, when the plant was shut down and is still idle. Their product during the year was (estimated) $23,000.

The total product of this county for the year 1882 was not less than $260,000, nearly all of which was gold.

MEAGHER COUNTY.

Messrs. Billings & Potting, who own a large number of locations in the vicinity of New York, on Trout Creek, have erected a 5-stamp mill just above the old town, to run by water. Test runs have been made from the Savage, Mammoth, Queen of the West, and other lodes with not altogether satisfactory results. From the largest lodes the ore taken was found to carry lead in such quantities as to make amalgamation difficult, and in some, as progress is made downward, refractory elements appear. The ore upon the surface seems to be covered with a coating of the red oxide of copper and iron, which adheres so tenaciously as also to interfere with results. To use a miner's phrase, the gold is "rusted." While much of the surface product is rich, it will require skillful manipulation to secure profitable returns.

The gold secured from the mill's operations during the year amounted to $3,000. The aggregate of pay from the Placers in 1882 was rather more in this county than during the previous year.

From Cooper Gulch, near Oregon, Buswell & Van Camp cleaned up	$3,700
From Cave Gulch by—	
Robert Shannon	2,100
J. Peterson	2,000
Samuel Marshall	4,600
From Avelanche (drifting) by—	
Hauck Bros	3,500
William Barnes	3,000
Chinamen (estimated)	4,000
From Grewells Bar, by John Anderson	3,000
From Diamond Flume and Hydraulic Company's ground, in Confederate Gulch, reported as "about the same as last year" (estimated)	22,000

This company's flume drains some of the rich bars in the vicinity of the well-known Montana Bar, out of which $600,000 was once taken in a single season; and Diamond City, which is credited with an aggregate yield of $1,000,000; and Gold Hill, which has produced $500,000;

and it is not unlikely that this year's estimate is too low. James King is manager.

From Thompson Gulch by—	
Smith Bros	$5,500
Other parties	2,000
From Eldorado Bar	6,500
From Oregon Park, by Ben Lawrensen	2,000
From head of Kingsley Gulch, by Joe Woodward	2,200
From Upper Cave, by James Phillips	1,500

The Western Star Mining Company of Philadelphia have reconstructed their 10-stamp mill at Diamond City, and apparently prepared to work the ore from their mines, but as yet no work has been accomplished beyond getting ready.

From the lower gulch, below Diamond City, Nanno, Buckingham & Co. cleaned up $1,885 and J. S. Keeley brought in $1,000.

Flumes have only recently been completed in this locality, and the future yield will be considerably larger.

The Clendenin Mining and Smelting Company is owned principally by Geo. H. Madock, of Boston, H. C. Tillinghast and W. H. Emery, of Chicago, and J. H. Emery, of Helena. H. D. Burghardt is general manager at Clendenin, and Prof. N. A. Foss is superintendent at the works. The above-named persons have invested in the Barker district $160,000, about one-quarter of which amount was expended in building their smelter and appurtenances, and in the early spring the smelter will be enlarged to 30 tons daily capacity and the roasting furnaces quadrupled by the addition of two larger than the present one. From Professor Foss the following statistics of production for 1882 were obtained: Tons of ore treated during the year, $933\frac{857}{2000}$, from which were produced 2,542 bars of lead bullion, weighing 240,542 pounds, and which carried 20,577 ounces of fine silver and 41 ounces of gold. At the close of the year there were on hand at the works partially prepared for the blast furnace, 700 tons of ore.

Heretofore the roasting capacity of this company has been only about 4 tons per day in their reverberatory furnace, and this has been supplemented by heap roasting. During the next year improvements estimated to cost the company $18,000 have already been planned. The company began working the Wright & Edwards mine under a lease last July, and it is currently reported that they have bought a controlling interest at $30,000. The deepest development yet done in the Barker district is in this mine, which is only 150 feet deep. One level is 310 feet long, and above this about 40 feet of the ore-body has been stoped out. The pay streak is from 8 to 24 inches thick, and is principally argentiferous galena, some zinc blende and iron pyrites being intermixed.

The Barker mine was worked in the early part of the season, but is idle now. It produces the same kind of ore as the Wright & Edwards; its main shaft is 75 feet deep and from it two levels have been driven, one 79 and the other 80 feet along the vein.

There are four mining districts in this portion of the Territory, known as the Barker, Montana, Running Wolf, and Yogo. The last named is a gold camp, and promises to open up some good paying quartz properties in another season.

More work has been done during the past winter months in the Montana than in the Barker district, and the prospects improve with development. Both dry and smelting ores are found, and the assays indicate an average of very high grade of product.

Some of the narrow veins in the Barker as well as the Montana district are exceeding rich, notably in the case of the Meeks lode in the former, where profitable results have been secured with only such transportation of the ores as a pack-mule would furnish, among the almost inaccessible fastnesses of the Belt Mountains.

Among the richest of the lodes in the latter district on which work is now being done, are the two locations covering 3,000 feet on a lode, recorded under the names of the Fitzpatrick and Sturdebrush, owned by Largent Bros., William Ulm, and Fitzpatrick. Assays from a 24-inch pay streak ran as high as 1,624 ounces of silver per ton, which was thought to be satisfactory proof of its value, but in the recent sinking on it, a streak of pay, measuring 6 inches in width, has been encountered from which the samples sent to the United States assay office show an assay value of $3,441.24 of silver per ton.

The mines of the *Maiden district*, in the Judith Mountains, near Fort Maginnis, have proved to be very rich, and seem to be permanent. The deepest development yet reached is by a tunnel into the Collar mine, which strikes the vein at a depth of 230 feet, where it is said to be 20 feet wide. A controlling interest in this property has been sold recently to parties interested in the Omaha smelting works, for $30,000.

The Oro Cache, owned by Messrs. Hauser & Holter, of Helena, has been quite extensively opened, and the ore is said to average in the vein, from wall to wall, about $50 per ton, and most of it is gold. A Huntington mill recently completed on this property has made some test runs, but has been unsuccessful thus far in saving the product. The best attempts yet made have not resulted in a saving of more than about $20 of gold per ton of rock worked. The gold amounted to $1,000 out of the several tests made.

The North Pacific location is galena-bearing, and from surface workings gives promise of becoming as rich a mine as any in that region. In July last the first shipment of high-grade ore from Maiden was made, and it was reported to average $400 per ton. It was from the Silver Star mine. There is known to be good placer ground in the vicinity of Maiden, but the supply of water is so small as to render the pay comparatively slight.

The aggregate of product for Meagher County will amount to fully $75,000 for 1882, exclusive of value of lead or any other items, excepting gold and silver.

MISSOULA COUNTY.

More development is going on in the Sweathouse district, 8 to 10 miles southwest of Stevensville, than anywhere else in the Bitter Root Valley. There are thirty-six locations recorded, some of which already show unexpected richness.

Hon. W. E. Bass and Abernethy are working 7 men in the Pleasant View. A shaft has reached the depth of 100 feet, and levels have been started, one of which is 15 and the other 7 feet along the vein, and the pay streak of solid galenite is 18 inches wide at the present workings. Another pay streak of darker and softer rock alongside of the galenite assays well, but Mr. Bass thinks the solid matter will average, according to the numerous assays made, fully 200 ounces of silver per ton.

The Elizabeth is owned principally by B. F. Tudor and A. S. Blake. George Orr has contracted to drive a tunnel for a distance of 200 feet and sink two shafts, each 100 feet deep, for one-quarter interest in the mine. He has reached the lode with the tunnel at a distance of 150 feet, and the walls seem to be as regular as on the surface, 150 feet above, where to all appearance the ore-body is 100 feet wide. J. J. Bond, who is part owner in this mine, says his assays of the average ore product show that it carries 40 ounces of silver per ton.

The Curlew has been prospected less than the other mines, but carries some rich galena. Mr. Bond had two assays made of the galena from the Curlew on the 23d of December, and the returns were respectively 234 and 204 ounces of silver per ton.

The Bitter Root Prince has been relocated. It was formerly owned by Andrew Buker. By many this is thought to be as valuable as any of the properties opened. Only a limited amount of work has been done, but the structure of the lode is found to be very perfect, and assays of its product range all the way from 20 to 800 ounces of silver per ton. Very little, if any, go'd has yet been found in this district.

Placers have been worked with about the average success in the four principal districts in this county.

In what is known as Three Mile, not far from Stevensville, 12 men have been employed, and in Nine Mile two companies have kept 25 men at work, and in Cedar Creek, where the diggings are deep, about the same number have been employed, and 10 men have been engaged in Quartz Creek. In Trout Creek, 12 miles south of Cedar Creek, Mr. Johnson has worked steadily on a tunnel which is ultimately to drain the bed-rock and open up placers which promise to yield largely. From these placers there has been realized in gold not less than $70,000 during the year 1882. Hon. Mr. Bass, of Missouri, estimates the quantity of gold produced in that region at not less than $150,000. Some rock tests have been made in arrastras, but the metal produced has been inconsiderable in amount.

SILVER BOW COUNTY.

The product of the Alice Gold and Silver Mining Company, of Butte, for the year 1882 amounted to 1,026,000 ounces of silver and $57,000 in gold.

The Alice mine has produced 14,800 tons of ore during the year, which, it is claimed, was worth between $30 and $40 per ton. A depth of 700 feet has been reached, and levels have been run at every 100 feet, extending easterly 500 feet and westerly to the end of the location. The eighty stamps of this company have been kept busy during the year, and a 20-ton Bruckner cylinder has been added to the plant. Large supplies of ore have come from the Magna Charta during 1882, and these have proved to be richer than the output of the Alice. William E. Hall is manager.

The 40-stamp mill at the Moulton mine has produced since January 17, 1882, and down to January 1, 1883, silver, in fine ounces, 306,000, besides some gold, shipped in the bullion. The mill uses about 40 tons of ore per day, and the amount of ore reported worked during the year has amounted to 12,000 tons. The character of the ore is about the same as the Alice—40 ounces silver and $3 to $5 gold per ton. Joseph K. Clark is manager.

The Silver Bow Mining and Milling Company have added ten stamps to the old mill, and during the year have produced 360,000 ounces silver from 10,950 tons of ore, which was taken from the Belle of Butte, Gray Rock, and La Plata mines. The Silver Bow mine has not been worked during the year. James A. Talbott is business manager of their affairs; John Downs, superintendent of mines; Richard S. Jones, superintendent of reduction works; and Denis Leary is amalgamator; and these four practical miners own about a dozen of the rich mines of Butte, with the mill above referred to, and constitute the Silver Bow Mining and Milling Company, having reached their enviable position by wisely turning to account the resources of the camp, which they as practical miners and good business managers were able to do; and the position of this company, more than any other, proves the truth of the assertion early made of this locality, that "Butte was the poor man's camp."

The Gagnon mine, owned by J. C. C. Thornton, has produced steadily during the year, and sold its ores to the Colorado and Montana smelter.

The Original Butte Company, adjoining the Gagnon on the west, although splendidly equipped, has been idle for the greater part of the year waiting an adjustment of its affairs among its promoters. It has sold to the smelter and to the Silver Bow Company probably $25,000 worth of ore for the season's work.

The Vulcan Mining Company's Tecumseh mine, owned and managed by about the same parties as are interested in the Original Butte, is also idle now, and for the same reason. It is a valuable mine and adjoins the Shonbar. Its product, which has been treated mostly at the smelter, has realized, it is estimated, $60,000 in silver and gold during the year. Lionel R. Nettre, manager.

The Original mine has produced about 1,500 tons of ore, similar to that in the Gagnon, claimed to carry from 5 to 15 per cent. copper, and nearly 100 ounces silver per ton. W. A. Clark, manager.

The Colorado and Montana Smelting Company, under the efficient management of Henry Williams, has produced during 1882, 495,000 fine ounces of silver, 1,320 fine ounces of gold, and 225 tons ingot copper. This company has also shipped from the Bell Smelter 200 tons of copper in matte, and 20,000 ounces (fine) silver. The value of the ores shipped during the year, $86,500.

The above yield of precious metals is included in the returns of the Boston and Colorado smelting works, and embraces the production of the Star West, Mountain Boy, and Burlington mines, owned by the company.

The Shonbar, owned by Le Caffe, Barrett & Co., adjoins the Vulcan and is making a good display of rich ore. One lot of 40 tons of Shonbar ore carried over 100 ounces of silver and $20 in gold per ton. This mine is equipped with only a 15 horse-power hoist.

The Star West, in the vicinity, is 200 feet deep at the main shaft, and in another shaft a depth of 100 feet has been reached, and the east level is in pay ore for a distance of 250 feet, and the west level for a distance of 350 feet.

The Anaconda and Saint Lawrence locations are owned by the Anaconda Mining Company, Marcus Daly, manager. The hoisting works upon this property are among the finest on the Pacific coast, costing $90,000, and on the 25th of June first began to raise ore from the mine. One set of No. 10 Burleigh air-compressors are used in the mine, and in the spring another set is to be added. The ore is claimed to average 35 ounces of silver per ton, and 18 per cent. copper. Up to December 1, 1882, this company had produced 86,689 ounces is silver, and since that time have increased the amount to 105,000 ounces. They have shipped 500 tons of ore valued at $50,000. The shaft on the Anaconda is 600 feet deep, with levels run at every hundred feet.

The Saint Lawrence is of the same character as the Anaconda, and duplicates of the works upon the latter will be erected upon this property in the spring.

The Lexington Company has reached a depth of about 500 feet in the development of their mine, and from the various levels it is easy to supply the 50-stamp mill with its full complement of ore as well as what is needed to mix with the tailings worked at their 10-stamp mill. The bullion from this company is sent directly to Paris, France. The 50-stamp mill has been in operation since about the middle of September on ore that it is claimed samples in the battery 60 ounces silver and $20 gold per ton. The small mill has run a large part of the year on tailings with some admixture of ore from the mine, and it is asserted that the new mill produces each month about the same as in November, when it was $89,869.21, and allowing for the product of the small mill, the aggregate product of this company for the year 1882, was not less than $400,000. Francis Medhurst, manager.

The Montana Copper Company has produced about 15 tons of copper matte daily, which carries from 55 to 60 per cent. of copper and some silver; it is claimed that $40 per ton is not too high an estimate, but in the absence of exact figures from the company only 20 ounces are taken for the purpose of making an estimate for the year. The company is owned by only four persons, and all information concerning its operations is given only from their New York office.

The Parrott Company has been under the management of Thomas Wallace during most of the year. They have treated at their own works over 18,000 tons of ore, which it is said has averaged 18 per cent. copper, and carried 20 ounces of silver per ton. A 100-ton-daily, double-geared hoist has just been completed over their three-compartment shaft at the Parrott mine, where there is ore enough "in sight" to keep it working to its full capacity for months to come. The matte produced at the Parrott Company is about 15 tons per diem. The results of the Parrott Company's smelter are higher in grade than those of the Montana Company, the process being carried up to very near the metal in some cases.

The Bell smelter ran less than half of the past year, and yet it is claimed that it has shipped 500 tons of copper matte to Denver; 100 tons to Baltimore, and still larger quantities to Liverpool, England, all of which was estimated to carry 46 per cent. copper and 60 ounces of silver per ton. James King is president of the Bell Company.

The Shakespeare Parrott Company, under the management of John Longmaid, started up their concentrator on the 1st of May, and ran until the 20th November, and turned out 3,000 tons of concentrations, said to average 36 per cent. copper, 2,000 of which was shipped to Baltimore and the remainder to Chicago.

The Clear Grit has produced $16,000 this year in silver, and works will be erected on the mine during the season of 1883. The Silver Bow Company treated most of their output, and the Colorado smelter the remainder.

The Ramsdell Parrott, Joseph Ramsdell, manager, has sent considerable ore to the Montana Copper Company, and some to the Parrott, the average value of which is 26 per cent. copper and 16 ounces of silver per ton.

The production of Silver Bow County in 1882 was about $3,740,000, nearly all of which was silver.

The stamps now active in Butte are as follows:

STAMPS.

Alice, 60 and 20	80
Lexington, 50 and 10	60
Moulton	40
Silver Bow	30

Dexter	15
Centennial	8
Clipper	5

CONCENTRATORS.

	Tons, daily capacity.
Shakespeare Parrott	50
Colorado and Montana	60

SMELTERS.

Colorado and Montana	40
Parrott Silver and Copper	50
Bell	50
Montana Copper Company	75

Summary of estimate of the gold and silver product of Montana for 1882.

Beaver Head	$750,000
Deer Lodge	720,000
Gallatin	30,000
Jefferson	450,000
Lewis and Clarke	425,000
Madison	260,000
Meagher	475,000
Missoula	70,000
Silver Bow	3,740,000
Total	6,920,000

Exclusive of the value of any of the base metals, lead and copper, in the bullion.

Of the above product $2,550,000 is gold and the remainder silver.

CHAPTER VIII.

UTAH.

A portion of the material embodied in the following review of mining and the production of the precious metals in Utah during 1882 was furnished by Mr. O. J. Hollister, of Salt Lake City.

The first prospecting for mines in Utah was done by General Connor's California Volunteers in 1863, and in 1866 an attempt was made to mine and reduce the silver-lead ores near Stockton, but practically it failed.

After the close of the war the condition of affairs was such that not only the discharged soldiers, but nearly every one except members of the Mormon fraternity, left the Territory.

When the Union Pacific Railroad joined tracks with the Central Pacific at Promontory on May 10, 1869, and a few months later, in December of the same year, the Utah Central reached Salt Lake City from Ogden, the immigration consequent to the completion of the roads gave countenance to the old prospectors, who returned, and the rich surface bonanza of the Emma mine was discovered in 1870.

The next year the nomadic prospecting element of the mountains and the Pacific coast flowed into Utah, and the whole Territory was hastily run over, and then, because of the advantages promised by a settled agricultural population, the mineral resources were more thoroughly tested than is usually the case in new mining sections.

The district at the head of the Cottonwoods and of American Fork, and of some of the tributaries of the Weber and Provo, was the most important in early times, and next in order ranked those of Bingham, Tintic, and Ophir. The district on the Sevier, 200 miles south, now known as Marysvale, was the scene of great activity, but none of its prospects developing readily into paying mines it was practically abandoned for several years. The district in Beaver County, of which Frisco is now the center, was a later discovery, although the Star and other districts lying all around what is now the town of Milford were early the scene of great activity and considerable production, which almost ceased when the price of lead declined so materially in 1877.

Silver Reef of Washington County was discovered in 1877, and in February of that year the new mill of the Ontario began work at Park City, the total production of this mine having been previously about $1,000,000.

From 1871 to 1881, inclusive, the mineral output of Utah was equivalent to about 195,000 tons of lead bullion, worth, with the yield of mills and placers added, $54,000,000 at Salt Lake prices; at seaboard rates, at least $60,000,000. There were more than thirty million (31,536,790) ounces of silver, and nearly one hundred thousand (93,595) ounces of gold.

The product for the calendar year 1882 is given by Mr. J. E. Dooly, Salt Lake agent of Wells, Fargo & Co., as follows:

Base bullion.	Pounds of lead, refined.	Pounds of lead, unrefined.	Ounces of silver.	Ounces of gold.
Frisco Milling and Smelting Company		3, 027, 424	214, 320	882
Germania Lead Works	8, 213, 789	561, 777	85, 082	169
Hanauer		5, 602, 324	254, 339	1, 384
Horn Silver Mining Company		32, 003, 775	1, 620, 357	
Mingo Furnace Company		10, 128, 738	316, 309	816
Other smelters		966, 000	53, 566	13
Total	8, 213, 789	52, 290, 038	2, 543, 973	3, 264
Deduct base bullion purchased by Germania Lead Company		713, 385	44, 968	124
Net product base bullion	8, 213, 789	51, 576, 653	2, 499, 005	3, 140
Lead, silver, and gold in ores shipped		773, 197	15, 464	193
Matte containing copper (605,880 pounds)			67, 320	1. 683
Total (605,880 pounds)	8, 213, 789	52, 349, 850	2, 581, 789	5. 016
DORE BARS.				
Germania Lead Works			303, 532	646
Ontario Silver Mining Company			1, 852, 664	
Silver Reef District			621, 879	
Tintic Mill and Mining Company			59, 814	447
Other mills and placers			15, 766	2. 930
Total dore bars			2, 853, 655	4. 023

RECAPITULATION.

605,880 pounds copper, at 12½ cents per pound	$75. 735
8,213,798 pounds refined lead, at 5 cents per pound	410, 690
52,349,850 pounds unrefined lead, at $52 per ton	1, 361, 096
5,435,444 ounces silver, at $1.12½ per ounce	6, 114. 874
9,039 ounces of gold, at $20 per ounce	180, 780
Total export value	8, 143. 175

Computing the gold and silver at its mint valuation and other metals at their value at the seaboard, it would increase the value of the product to $10,312,902.

According to the above statement, the value of the gold and silver product of Utah, calculated at coining rates, was $186,852 of gold and $7,027,644 of silver.

From this amount a deduction must be made for silver ores from other Territories shipped to Salt Lake City for treatment and appearing in the foregoing statement. From the best sources of information at my command I estimate the amount to have been about $225,000.

The following table shows the production of Utah, during 1882, estimated by counties:

County.	Gold.	Silver.	Total.
Beaver	$20, 000	$2, 400, 000	$2, 420, 000
Juab	60, 000	300, 000	360, 000
Pi Ute	5, 000	10, 000	15, 000
Salt Lake	102, 000	640, 000	742, 000
Summit		2, 500, 000	2, 500, 000
Tooele	3, 000	50, 000	53, 000
Washington		900, 000	900, 000
Total	190, 000	6, 800, 000	6, 990, 000

BEAVER COUNTY.

Beaver County contains five parallel mineral-bearing ranges—the Wasatch, Granite, Star, San Francisco, and Wah Wah.

The principal mining district is the *San Francisco*, situated in the mountains of the same name. The chief camp of the district is Frisco, the present terminus of the Utah Central Railroad, and about 240 miles from Salt Lake City.

The well-known Horn Silver mine is situated about a mile from the town, on Bonanza Hill. Operations have been steadily and successfully prosecuted during the year. It reports a production of 16,000 tons of lead and 1,620,357 ounces of silver, and paid four quarterly dividends of $300,000 each. The mine is opened by two shafts; the main shaft is in the hanging country rock and is 600 feet deep. The second shaft is used so far only as an air-shaft; it is down 300 feet and drifts run southwesterly to connect with the levels from the main working shaft. There is an exceedingly strong vein containing a variety of ore, from low-grade galena to high-grade milling ore; but little has been taken out below the 300-foot level. Everything about the mine and the company's smelters at Frisco and at Franklyn is well arranged for economical working; the ore is run in cars from the hoisting works to bins, from which it is dumped into cars on the Central Utah Railroad for shipment to Franklyn, and labor-saving machinery is used to such an extent as to reduce the cost of operating to a minimum.

The South Horn, North Horn, and the Lulu are locations south and north of the Horn Silver, and supposed to be on the same great contact fissure. There is a heavy zone of highly mineralized rock in all of them, but no clean ore, rich enough to pay has been found in available bodies. They require capital, and probably that only, to bring them to the productive stage.

The Frisco Company own the Carbonate and Cave mines, and their single stack ran out during the year 1,514 tons of lead, 214,320 ounces of silver, and 882 ounces of gold, chiefly from ores from the two above-named mines.

The Carbonate mine is situated in the foot-hills of Quartzite Mountain, 2 miles from Frisco. Seven levels have been opened, the seventh being 500 feet from the surface. The vein is very strong, but four-fifths of the vein matter is decomposed country rock necessitating concentration before smelting.

The Cave mine is in *Bradshaw district* across Beaver Valley, nearly 30 miles to the eastward of Frisco. It is situated on the west side of Granite Range, which bounds the valley on the east. It is a series of large and small caves in a limestone formation filled with iron ore, carrying both gold and silver, and also with lead carbonates, the usual form of lead-silver ores in Utah. These are caves which are of all shapes and sizes, are sometimes independent of each other, though usually they are connected by stringers of ore or vein matter. The mine is developed by two tunnels; one has been driven into the mountain for a distance of 1,100 feet, and there seems to be more of the lead-silver and less of the iron ore the further they work in. Five hundred feet higher and on the Cave extension another tunnel has been run, which leads to a labyrinth of caves containing a better quality of ore than that in the Cave mine. Such of it as is deemed suitable to work averages 35 per cent. of iron and 40 of lead, carrying 18 ounces of silver and $7 of gold per ton. The richest ores appear to be found on the floor of the caves.

The ore is shipped to the company's smelter at Frisco. The company also has a very complete and successful concentrating mill in connection with the Carbonate mine. The ore is fed from the cars into a rock-crusher, and from thence it passes into a revolving iron cylinder heated by a small furnace and placed on an inclination of about 20°. From the cylinder the dried ore passes through three sets of Cornish rollers and is then carried by an elevator to the upper story of the mill, where it is sized by six revolving screens; from the screens the ore passes down through dry-air concentrators which separate the ore from the waste, the former being delivered into barrels and taken to the smelter, while the latter is further worked through five wet jiggers, which recover any ore that may have passed the dry concentrators into the waste. The ore from the Carbonate mine is very successfully treated by this method, one ton of fine galena, carrying 50 per cent. of lead and 150 ounces of silver, being concentrated from 5 tons of vein matter.

Copper Gulch, 3 miles northwest of Frisco, at the foot of Granite Mountains and adjoining Quartzite Mountain, has been attracting considerable attention from the large amount of copper-bearing ore discovered. A heavy ledge, 50 to 150 feet wide, has been traced for half a mile, and a number of locations have been made, among the principal of which are the Cactus, Comet, New Haven, Morrison, Coal-Burner, Southern Utah Times, and Drunkard; all are being opened, but the first two named are as yet the most noted.

The ores are mainly sulphurets of copper with considerable gray copper carrying silver distributed through the vein matter, which, like the country rock, is an imperfect granite, friable in its texture and much lighter than the ores, which can therefore be easily separated from the vein matter after coarse crushing by the use of jiggers, sufficient water for this purpose being supplied from the mines. The concentrates should then be reduced to regulus or matte on the spot.

On the Cactus property steam hoisting and pumping works have been erected within the year as well as ore houses, offices, and other necessary buildings. A double-compartment working shaft has been sunk 100 feet, from which point they are drifting to cross-cut the vein. The ore averages 25 per cent. copper, and yields 20 ounces of silver to the ton, although bunches of ore are found of a very high grade.

The Comet is on the same ledge, 2,800 feet east of the Cactus, and the ore is of like character; it is opened by a tunnel and shafts running through ore, which becomes firmer as depth is attained.

The New Haven joins the Cactus on the north, though lower down, and was the first location made. So far as prospected, this property makes an excellent showing; in addition to the prevailing ores of copper, nuggets and lumps of native copper have been found.

The Morrison lies between the Cactus and Comet, and is opened by tunnel.

The Coal-Burner and Southern Utah Times are adjacent to the same mines, and development work shows that the ore is identical with that exposed in the deeper explorations of the ledge.

Although but little work, comparatively, has been done on any of the mines in Copper Gulch, it is obvious that systematically developed and economically and judiciously managed these properties will prove the nucleus of a new and prosperous camp. A narrow-gauge road, connecting Copper Gulch with Frisco, would have to turn the mountain and cross via the Pioche wagon road, and would be 12 or 15 miles long, but it would materially assist and hasten the development of the camp.

Granite Range lies between Beaver and Milford and the Star Range next west from Milford. Both are mapped into mining districts, the chief being Star, Lincoln, Bradshaw, and Granite. Some of the mines have produced largely in former times when lead was high; many of them have extensive workings and present quite favorable indications, and in some cases considerable ore-bodies. Among those which are being developed, as the means of their owners permit, are the St. Mary's, Mammoth, Talisman, Victor, Magnolia, Lake Superior, December, Lone Brother Nos. 1 and 2, Hoosier Boy, Wasco, Kannarrah, Tribune, Burning Moscow, Boston, and Baltimore. The ores as a general thing are of low grade, but there is an abundance of them. The shipments to the Shauntie and other smelters averaged for 8 years 45 per cent. lead, 40 ounces of silver, and $5 to $10 gold per ton. Capital and well-directed energy would in a short time make Millford the center of as prosperous a mining region as there is anywhere in Southern Utah.

The production of Beaver County during 1882 was mainly from the Horn Silver mine and from the various properties of the Frisco Mining and Smelting Company, which amounted to $18,232 in gold and $2,372,107 in silver.

The total production of the county was $20,000 gold and $2,400,000 silver.

JUAB COUNTY.

The principal mining district in Juab County is *Tintic*, situated in the Oquirrh Range, in the eastern part of the county.

In this district there are several ore-producing mines, which ship their ores to the Sandy smelters.

The general trend of the veins is north and south, and the ores carry copper, lead, and other base metals, in addition to gold and silver, and to a great extent are refractory.

In point of development and production the most important mine is the Crismon-Mammoth, belonging to the Mammoth Company. It is opened by two shafts to a depth of about 500 feet; the main chimney is nearly 100 feet wide, inclosing some lime horses. The ores are chiefly copper carbonates and oxides, of varying richness in gold and silver, but averaging perhaps $15 gold and $29 silver per ton, and containing 10 per cent. of copper. The mine has been a large producer for eight years, and will likely continue to yield large amounts of ore in the future. The ore was formerly worked in a 27-stamp mill belonging to the old Mammoth Company, but by the process employed scarcely one-half of the gold and silver was recovered, while all the copper was lost. Early in the year, after some experimentation, two matting furnaces were erected, and after a trial had been made the mill was closed and additional furnaces were constructed. Eight furnaces of a daily capacity of 8 tons of ore each are in operation. By this process 5 tons of ore produce 1 ton of matte, at a cost of $12 per ton of ore; the matte is worth about $200 per ton at Salt Lake. The process is a metallurgical success, and it is believed that the conditions are such as admit of its being made a success economically. The manager is Mr. W. H. H. Bowers, of Salt Lake City, who has interested English capital in the project. The intention is to increase the number of furnaces until a capacity of 200 tons per day is attained, and also to erect refining or separating works probably at or near Sandy.

The British Tintic is situated south of the Mammoth mine, and presents all the geological features of being a prolongation of the same; the ores extracted are copper carbonates and oxides, carrying gold and antimonial silver. During the year 1879 there were shipped to the Ely mill 175 tons of ore, carrying 15 to 20 ounces silver and 10 to 20 per cent. copper per ton for reduction by the Hunt & Douglas process for separating the copper from the precious metals contained in the ore. There were also shipped at the same time 125 tons of milling ore, carrying 60 ounces in gold and silver per ton. The property is now lying idle.

The Tintic Mining and Milling Company has a complete 10-stamp chloridizing mill at Homansville. The company does not own any mines, but different members of it own the Northern Spy, Elmer Ray, and Park, and an interest in the Golden Treasure.

The Northern Spy supplies the mill with a majority of the ores reduced. The mine has been systematically and economically worked; the developments are not extensive, the shaft having obtained a depth of about 200 feet, most of which has been through ore averaging in gold and silver $65 per ton, and which is perhaps the best milling ore found in Tintic.

The Park mine carries ore rich in both lead and silver.

The Elmer Ray has some milling ore, but it is chiefly iron pyrites, and is shipped to the reduction works of the Mammoth Company, where it is used as a flux in the matting process.

The Tintic mill in 1882 produced 87,223 ounces of silver and 690 ounces of gold, of a coining value of $112,517 silver and $14,262 gold.

The Carissa is on the same vein as the Northern Spy. A shipment of ore worked at the Ely mill yielded 29 ounces of silver to the ton.

On the eastern slope of Mammoth Mountain, about a mile and a half north of the Carissa and Northern Spy, are the Nilsson and Josephine, which, although undeveloped, are prospects of a promising character. The Caledonia tunnel has been projected to cut this vein at a depth of 700 feet.

Two miles north of the Mammoth mines are those of the Eureka Hill Company, which are in lime and produce a variety of ores of all grades, chiefly carbonates of lead and copper. The mines have extensive workings and have turned out considerable bullion. They have a steam hoisting works, but no mill; the ores are shipped and sold usually in the Salt Lake market. Although occasionally they are very rich, yet the average market value is $30 to $40 per ton.

The Beck and Bullion mines are recent locations immediately adjoining the Eureka Hill mines on the north, and the ores are of the same general character though pockets of rich chloride are met with. These mines have not been exploited to a greater depth than 180 feet, yet the sales of ore during the year aggregated over $100,000.

About a mile east of Silver City is a group of mining claims which have been partially developed, the principal being the Governor, Turk, June, and Daisy.

The Julian Lane, southeast of Silver City, has nearly 4,000 linear feet of workings; the average value of the shipping ore is about $149 per ton.

The Golden Treasure, adjoining the Julian Lane, has free milling ore of good grade. Mining costs about $8 a ton, and milling from $16 to $24 according to the character of the ore.

West Tintic district is situated on the western slope of the Skull Valley range of mountains. Most of the veins are contact, and are opened by shafts varying in depth from 25 to 200 feet. The ores carry considerable copper, and will probably have to be treated in matting furnaces and the product shipped.

The best developed mine is the Scotia, on which four shafts have been sunk, the deepest being about 200 feet. The mine was formerly worked to some extent and considerable ore extracted, chiefly lead carbonate with bunches of galena, although copper as a carbonate also occurs.

Southeast of the Scotia is the Carpenter, in which an irregular vein formation is exposed by 160 feet of shaft; the ore is similar in character to that found in the Scotia.

The Queen Bee, southeast from the Carpenter about a mile, is also a contact vein between lime and quartzite, carrying ores of copper and lead.

Detroit district, 30 miles northeast from Deseret, contains a belt of copper ores of highly promising character. A number of locations have been made, chief among which are the Juno, E. P. H., Howard, and Annie.

The Juno is a fissure vein in porphyry, 4 feet in width where exposed by a 35 foot shaft.

The E. P. H. has a shaft 100 feet deep, showing 9 feet of vein material; the ores are of copper, with some bismuth.

Central and Western Juab County will probably be better known in the future for its product of matting rather than of milling ores, but capital is needed for its development, as well as easier and more rapid means of communication than now exist.

The production during 1882 was $60,000 in gold and $300,000 in silver.

PI UTE COUNTY.

On the eastern slope of the Wahsatch Range, around Mount Baldy, on the affluents of the Sevier River, are the Marysvale mines.

Ohio district is west of the town of Marysville, and contains some properties which are yearly growing into prominence. Chief among them are the Copper Belt, Mohawk, Belle of the Vale, Manhattan, Webster, Bully Boy, Star, Giles, Filmore, Elsie, Sierra Nevada, Bucher, and Chattanooga.

The Copper Belt has a shaft of about 300 feet in depth, in which a 3-foot vein of fair milling ore, containing some gray copper, has been exposed. The company has a 10-stamp mill in Bullion Cañon some distance from the mine, which was started early in the year, but so far the yield of bullion has not equaled expectations, either because the ores are not sufficiently rich or that the mill is not suited for their treatment, having been erected before a thorough test of the ore had been made to ascertain the most suitable method of reduction.

All the ores of the district are somewhat refractory in character, and in most cases require a roasting process preliminary to milling. In most of the mines mentioned large bodies of ore are known to exist, but it is medium or low grade.

Mount Baldy district lies south of Ohio district. The chief mines are the Deer Trail combination, consisting of the Deer Trail, Green Eyed Monster, and Cliff.

The Deer Trail carries galena and carbonate, shipments of which have yielded an average of $100 per ton. The indications are favorable for the future development of a valuable lead-silver mine.

The Green Eyed Monster has been more developed than the other properties of the company, and it is reported that upwards of 150,000 tons of low-grade ore have been exposed by the various tunnels, shafts, and winzes, which aggregate probably 5,000 feet. The ore yields at the rate of $10 silver and $12 gold to the ton, and would have to be concentrated for profitable working. An effort is being made to consolidate this property with the Copper Belt mines and mill.

The Cliff mine is south of the Deer Trail, and though the development is small it is sufficient to show that the same character of ore exists. In the southern part of the district in Cottonwood Cañon is the Crystal, in which the ore found is of higher grade, carrying native silver and free gold besides chloride and carbonate. Only development work is in progress, no machinery for treating the ore having been as yet erected.

The Bushey, about a mile northwest of the Crystal, contains the same character of high-grade ore.

The Uncle Sam, Best Out, Home Stake, Clyde, and Pell are all being prospected in a modest way.

The district needs capital, for the mine owners, as a rule, are poor men. The country is well timbered and watered. It is 90 miles from Juab, on the Utah Central. The Denver and Rio Grande Railroad has located a line down the Sevier Valley through Clear Creek Pass which, if built, will open what will undoubtedly prove to be a rich and productive mining region.

The production of Pi Ute County for 1882 was $5,000 in gold and $10,000 in silver.

SALT LAKE COUNTY.

The product of the Sandy smelters, the Mingo, Germania, and Hanauer, for 1882 was 959,262 ounces of silver, 3,015 ounces of gold, and 12,253 tons of lead. In 1881 the product was 962,975 ounces of silver, 1,778 ounces of gold, and 10,662 tons of lead. This comparison shows that the mines of Alta, Bingham, Stockton, and Tintic, from which the smelters obtained their principal supply of ores, yielded as well as during the preceding year. In fact, they did better, for during the past year the amount of ore shipped to Sandy from Idaho and Montana was not over 50 per cent. of the amount shipped in 1881, in which year the product of Idaho and Montana ores smelted by the above-mentioned works amounted to 441,846 ounces of silver, 976 ounces of gold, and 2,000 tons of lead. During 1882 the ores from these territories were shipped principally to Omaha or San Francisco, better terms having been offered by the railroads.

The chief shipping mines of Alta during the past year were the Joab Lawrence, City Rock, Flagstaff, Eclipse, and Prince of Wales. All of them are now in good shape, and promise an increased production during 1883.

The City Rock has a large amount of ore-bearing ground opened by a series of adit tunnels driven into the hill and on the vein, which are about 250 feet apart; the lowest tunnel is 1,200 feet on the dip below the surface croppings on top of the hill and at the east end of the mine. The tunnels are connected by winzes with double chutes, one of which is used for ore and the other for waste. There are now in sight 20,000 tons of $40 ore—ore that will sell for $40 per ton at the smelters. The two lower levels or adits are being driven in towards the east line of the property, and have each about 1,000 feet to go. When this is accomplished and winze connections made with the upper levels the City Rock will be the best opened mine in Utah. There will be a section of the vein averaging 1,000 feet in length by about the same in depth, in which little stoping has been done. The ore varies in thickness in this vein from a few inches to several feet. One-fourth of it is first-class ore, ready for shipment; the remainder requires dressing, which can be cheaply done and with but slight loss of ore. That sent to the market is graded to about $60 a ton, the mines receiving a little more than $40 a ton.

The Eclipse is sinking a new shaft. This was rendered necessary on account of the refusal of the Flagstaff to continue to allow them to use their shaft, which is connected with the lower workings of the Eclipse. Heavy hoisting machinery has been erected and a substantial shaft-house built.

The Flagstaff has contracted for the sinking of its shaft 100 feet to a new level.

The Joab Lawrence is the largest shipper of ore in the camp and keeps prospecting work well ahead. The ore deposit seems to be unusually reliable in this property.

In the Emma mine, which at one time produced $5,000,000 worth of ore and paid $2,800,000 in dividends, operations have been recommenced. At the end of the Bay City tunnel, which runs into the mountain 1,600 feet, and is 1,000 feet from the surface, a chamber was cut for hoisting works, and a working shaft is being sunk in the hanging wall or country rock, from which drifts will be run to the vein at suitable intervals; the shaft will cut the vein itself at a depth of 500 or 600 feet. No work has ever been done on this ledge below the tunnel level, but as above it the immense pockets of ore were found which yielded so enormously, there is reason to believe that others will be met with below. The troubles with contestants have been settled by purchase and consolidation, and the company now has ample ground for extensive operations.

The Toledo and Frederick mines and the Frederick tunnel have been consolidated. The mines are situated high on the mountain, in almost an inaccessible spot, and can be worked much more economically by a tunnel than by any other method. This is now in 1,600 feet, but it must be driven 500 to 1,000 more before it will cut the ledge. Both mines formerly produced largely, and no doubt will do so again, now that they have combined interests and secured means to complete the tunnel.

Important prospecting has been carried on during the year in many other mines of the district, but development work has not yet been carried to the producing stage.

The Prince of Wales looks better than it has for years. Like the City Rock it is a fissure in lime, cutting the beds nearly at right angles. The country rock appears to be harder and of a more compact texture than that of the City Rock. The mine is opened vertically and lineally to a great extent. It has been worked for about ten years. During 1882 it produced and shipped 500 tons of ore. It has substantial buildings and hoisting works.

The Big Cottonwood ores all go to the Salt Lake market, but most of the producing mines are situated so high on the ridge dividing Big from Little Cottonwood that the ore can be taken down to greater advantage through Little Cottonwood Cañon by means of the tramway of the Wahsatch and Jordan Valley Railroad.

The Richmond and Teresa, the Oregon, Butte, Reed & Benson, and the Carbonate are situated high on the dividing ridge. The Oregon, Reed & Benson, and the Carbonate are accessible only from the Little Cottonwood side. They are not producing much at present. Formerly the Reed & Benson was worked from the top of the mountain, but for seven or eight years past the owners have been driving a tunnel from the base of the mountain, which has reached a depth of 2,000 feet, and shows signs of entering the ore-bearing formation.

The Maxwell, as well as the Reed & Benson, is on the same line as the Emma and Flagstaff. The former has been a regular producer of 5 or 6 tons a day, and has paid dividends. It is the property of an Eastern company.

Kesler's Peak also holds up a little patch of the original formation, and in it is the carbonate. Whether it is exhausted or not is uncertain.

It seems that in all these mines for a thousand feet down on the dip of the formation are carried the ore chimneys, chutes, and channels, and below that they give out or cease to pay, thus giving color to the theory that the presence of the precious metals in the ores was due to surface agencies. The same thing is observable at Leadville, in Colorado, and elsewhere. The Iron Silver at Leadville pitches into the hill at an angle of 20° below the horizon, and the hill rises at a considerably steeper angle. They claim 300 feet on the dip, and beyond that distance other parties on top of the hill are sinking for the same vein. It is doubtful whether the ore will continue that far, or, indeed, so far as 2,000 feet. The overlying country rock is so deep as to have prevented the operation of surface agencies.

The Emma, Flagstaff, and all the mines in the Little Cottonwood belt go down more or less like wells, the same as the channels in the Iron Silver, Silver Chord, and mines on Carbonate and Fryer Hills at Leadville, and in both places everything seems to indicate that the ore is lost for all practical purposes at a greater or less distance from the surface, governed largely by the thickness of the hanging country rock, and seldom exceeding 1,500 or 2,000 feet.

There are many promising prospects in Big Cottonwood district, and perhaps a dozen companies have been incorporated, each owning several locations, and nothing is needed but capital to make some of them producing and profitable mines.

At Bingham, the lead-producing mines at present are the Lead, the First West Extension of the Telegraph, Yosemite, Old Telegraph, Spanish, Jordan, Utah, Tiewaukie, Neptune, Gem, Sundown, and Aladdin. In 1882 this district shipped from 7,000 to 8,000 tons of ore, and the Stewart and Stewart No. 2 mills reduced considerable gold-bearing ores.

The Old Telegraph mine was worked under lease from the French company which owns it. The lease has expired and the mine is not worked at present. The company owning the mine has transferred its headquarters to Butte, Mont.

The Lead mine has a large chimney of low-grade ore, opened about 600 feet in depth, and laterally by several levels or drifts. At least four-fifths of the ore requires to be dressed to bring it to a working grade. For this purpose a mill, with a capacity of 100 tons of crude ore per day, has recently been built in Bingham Cañon, and a tramway of about 4 miles in length constructed to bring the ore from the mine. From the location of the mine and its exploration it is considered to be below the belt of pyrites which cuts out the oxidized ores in most of the Bingham lead mines, and in consequence of this it is expected that the ore will be found in an oxidized condition to an indefinite depth. It has usually been held that these low-grade lead ores could not be profitably concentrated, but the owners of the Lead mine, who are experienced, practical mining and milling men, claim to have demonstrated that it can be done, and to this end have expended $40,000 in erecting the necessary buildings and constructing suitable works. The First West Extension of the Telegraph and the Yosemite were quite heavy shippers of ore in 1882, and both mines are looking well and promise a steady production for some years to come.

The Yosemite is a well-defined fissure vein, on which there are about 2,400 feet of workings. The ore is of low grade and is concentrated prior to reduction. Three tons of ore are reduced to one ton by a concentrator of a capacity of 80 tons of crude ore per day.

The Utah and the Jordan mines have vast bodies of oxidized iron ores, carrying perhaps an ounce of gold per ton and an equal value in silver, besides bodies of lead ores, which are being leisurely taken out and marketed. The gold-bearing iron ores are being experimented with, in order to ascertain the best method for their treatment. By the ordinary stamp process from $5 to $10 in gold per ton is saved, but the rest of the gold and all the silver are lost, and the owners are unwilling to reduce their ores with such imperfect results until satisfied that a more successful process cannot be adopted.

The Jordan has a 10-stamp mill at the mine and a 60-stamp mill on the Jordan River; the latter is a new mill and has not yet been in operation, and probably will not be run until the result is known of the experimental tests now being made of the low-grade ores.

The Stewart mine is worked in an open cut in which at least 400,000 tons of ore are in sight. It lies upon a hillside 400 feet above the level of the Carr Fork. The ores are similar to those of the Jordan, and carry an average of $10 in gold and the same in silver. The owners have no faith that anything better can be done with them than to reduce by the stamp process, and during 1882 a 20-stamp mill was in operation, reducing about 50 tons per day, from which about $5 a ton was realized. It is claimed that there is as large a profit in the Stewart as in mines of the Black Hills if the cost of mining and milling can be reduced to a minimum, and accordingly the mine is being opened below the water-level by a tunnel which is now under the deepest workings, but has yet to be connected with them by an upraise of from 100 to 200 feet. It is in contemplation to move the mill to the mouth of the tunnel and increase its capacity by 40 stamps; then by means of chutes the ore can be delivered at the mill at a cost of not over a dollar a ton.

The Stewart No. 2 adjoins the Stewart, and appears to be on the same body of ore. It has a 10-stamp mill, which reduces about 25 tons of ore per day. An Eastern company has been working the mine for several months past with reported success.

The Tiewaukie bears a high-grade but complicated ore. A year ago the title to this mine was in dispute, but an agreement and a consolidation of interests have been effected, and the mine, which comprises a dozen or more locations, is being prepared in a careful and thorough manner for production. It added little if anything to the output of the district for 1882.

The Lucky Boy, in Black Jack Cañon, in the near vicinity of the Bingham mines, bears a similar ore. Two or three years since it was sold to a New York company, and operations have been confined to running a large and deep working tunnel and exploiting the ore-bearing ground or vein. Work has been steadily carried on, and the company now find that they have ore exposed on two or three sides sufficient to justify the erection of reducing works, which the company contemplate constructing during the coming season.

Three or four mines at Stockton have been steady producers and shippers; nothing much, however, was done at Ophir or Dry Cañon. At the latter place the Hidden Treasure Company are running a tunnel which it is expected will cut the ore-bearing country rock 300 or 400 feet below the old workings and provide for the extraction of ore from the base instead of from the top of the hill. This mine had a great ore chimney which was followed down nearly 1,500 feet, and the owners believe its extension may be found still deeper; this will be ascertained when the tunnel is completed.

A revival of mining in these almost deserted camps is among the probabilities of the future.

The whole country was in years past hastily run over in the search for mines, and the history of all mining sections shows that usually there is a return to abandoned but not exhausted districts.

The American Fork, which rises near the sources of the Cottonwoods, in past ages cut away a great part of the once mineral plateau that contains the Emma, Flagstaff, Crescent, Ontario, Miller, Pittsburgh, and Silver Bell. The chief mines lie at the head of the stream in Utah County, but the ores all find a market at Sandy and Salt Lake City.

This mineral plateau was once about 10 miles square and its altitude about 10,000 feet above sea-level, but glacial action, together with water, carried off nearly the whole area, with its untold wealth, and at the present day it is only where great peaks and ridges between the heads of streams still bear up remnants of the original formation that mines are found. This is seen, not only on the American Fork and on the Cottonwoods, but on the eastern side, also, on the affluents of the Weber and Provo Rivers.

In *American Fork* district the leading mine is the Silver Bell, a combination or group of locations near the Miller, which in former days yielded largely. A shaft has been sunk 400 feet and levels opened on the strike of the vein in milling ore of good grade. Some ore was shipped in 1882, but operations were confined chiefly to driving a long adit, which will, when completed, be 600 feet below the bottom of the shaft. This is to afford better drainage to the mine, exploit the ground, and add to the convenience and economy of working. The adit will be 2,500 feet long, about one-third of which has been run, and it is reported to have already entered good ore.

Several Eastern as well as local companies own property in this district, which they are opening and improving as their means warrant.

The Wild Dutchman and the Milkmaid are steady shippers of ore. The latter is well equipped with steam pumping and hoisting works. It produces a good grade of smelting ore.

The Pittsburgh has a large deposit of low-grade lead ore, but the mine was not worked during 1882.

The Elizabeth B. Kelsey is above the Milkmaid, on the same side of the cañon. It was incorporated a year ago, under the name of the Silver Lake Company, and operations were commenced, but after running a few months work was suspended.

The J. L. McCall is well opened by tunnels and drifts. It has a strong vein, carrying high-grade ore. This district is situated high on the mountains, and is almost inaccessible in the winter, in consequence of which the development has been greatly retarded.

Salt Lake County also draws ores from Summit County, as well as from the American Fork in Utah County, from Tintic in Juab, Marysvale in Pi Ute, and Ophir, Dry Cañon, and Stockton in Tooele. For this reason it is difficult to ascertain the individual production of the various counties shipping ores to Sandy and Salt Lake City.

The production of the county in 1882 was $102,000 gold and $640,000 silver.

SUMMIT COUNTY.

In Summit County the chief event of importance affecting its mining interests, which occurred in 1882, was the consolidation of the Pinyon, Climax, and Rebellion locations, on Pinyon Hill, the new organization being called the Crescent Mining Company. They have also purchased the Walker, Webster, and Buckeye, giving them a total of about 200 acres, containing, as shown by present developments, the largest body or bodies of lead-silver ore now known, independent of the prospective value of the undeveloped ground.

Pinyon Hill is a section of a ridge which originally was part of the ore-bearing lime plateau at the head of the Cottonwoods, before spoken of, but which the waters, now subsided into the affluents of the Weber, have chiseled into its present form. Mount Clayton, the corner stone of Salt Lake, Utah, and Wasatch Counties, seems to be the central point from which the glaciers, and then the waters, flowed away in every direction, leaving these supporting ridges sloping downward, more or less ragged and veering somewhat in course, until they end at the confluence of streams with the main river or else form parks and valleys. Pinyon Hill ends in this manner in Parley's Park. The hill is two or three miles southwest of Park City and rises 10,000 feet above sea-level. The ridge here is stratified lime, breaking off suddenly towards the east and making an angle of 15° or 20° with the northwestern horizon, sloping smoothly down to the bottom of Thaynes Cañon. It contains ore, and possibly two bedded veins or strata of smelting ore broken up by several faulting fissures cutting through them and perhaps enriching them. The ore outcropped on the east face of the ridge near the top, and this outcrop was located by the Pinyon Company ten years ago. They exhausted the ore-bodies in the face of the hill, and although drawn at some points beyond their west side line, they were misled by the faulting fissures spoken of into supposing that their vein was a vertical one striking north and south instead of a blanket vein sloping with the surface of the hill and lying about 100 feet under the surface; the mine was therefore practically abandoned.

Some of the men who had been employed in the Pinyon mine having observed that the ore in places appeared to lead off towards the west, located the surface of the hill sloping westward and northward, and sinking down upon one of the faulting fissures came into the sheet of ore and claimed its apex. This was the Climax Combination.

A thousand feet lower down the hill, towards Thaynes Cañon, other parties drove a tunnel into the hill, and also entered the ore sheet which as found here was thicker and much richer than in the older workings. This constituted the Rebellion group.

Above the Climax, the Walker, Webster, and Buckeye, holding 500 or 600 feet under deed from the Pinyon, drove a tunnel southwesterly from the east face of the hill, and all the way in ore, and exposed thousands of tons, although it was somewhat of a lower grade.

All the locations have now been consolidated and incorporated as the Crescent. No work except for development has been done, yet in December, 1882, the new company sold $42,000 worth of ore, which had all been taken out in prospecting. The vein occasionally breaks off in steps towards the west and north, and in these steeper inclines it is pinched to a foot or two feet in thickness. Then there will be a space nearly level where the vein will run from 4 feet to 8 feet, and sometimes 20 feet, in thickness. Enough of work has been done to indicate a continuous sheet of ore from the Climax above to the lowest workings of the Rebellion below, 1,000 feet long by 300 feet wide. This ore deposit has been estimated by good judges to contain not less than 100,000 tons of ore, which, from numerous working tests made from all parts of the opened mine, should net $20 per ton, leaving quite as much more to pay for the expenses of mining and milling. This ground in area comprises scarcely ten acres, and it may include most of the ore sheet; but to all appearances there are many times as much ground that should be good.

The hill has a wonderful resemblance to Ruby Hill, at Eureka, Nev., which has produced so largely during the past ten years, and in some respects the ore-body resembles the beds in Carbonate and Iron Hills, at Leadville, except that here their inclination is with instead of against the hill, which obviously is a more favorable situation. At Leadville the ore vein, although of the general character of a blanket vein or in a stratum conformable to the general stratification of the formation, makes chiefly in channels irregular in shape and size, similar to the troughs between sea waves, but still pretty well defined and regular when taken as a whole, and more or less connected laterally with each other. On account of the general similarity of formation Pinyon Hill might well be termed a Utah Leadville, and it would be no matter of surprise if Scott Hill, on the opposite side of Thaynes Cañon, should prove to be the same kind of ore-bearing ground.

All the ridges making off between the streams from the center of the upheaving force, where not eroded and gone, should be mineral-bearing, since without doubt they were originally the bottom of the same sea, and were subsequently subjected to the same influences.

Standing upon Pinyon Hill and looking to the eastward, the evidence of the prodigious action of water can be seen in the smooth rolling hills. The lime formation which is held up by the higher ridges is here largely gone, and a loose wash alone is left on top of the quartzite and porphyry dikes.

Two miles east of Pinyon Hill, and at 2,000 feet less altitude, is the justly celebrated Ontario mine. But little that is new can be said of it. During 1882 it steadily continued its output of ore, producing 1,852,664 ounces of silver and paying $900,000 in dividends, bringing its total production to upwards of $12,000,000, and its total dividends $4,925,000.

The mine is opened nearly to the 900-foot level. There are three shafts, each provided with extensive hoisting and pumping works. The shafts have three compartments, two for hoisting and one for steam and water pipes. From the shafts levels have been run every 100 feet, connected by the usual cross-cuts, winzes, &c. The mine is well timbered everywhere, but is very wet, making water at the rate of 2,000 gallons per minute. This probably accounts for one-half of the total cost of mining and reduction. In the last shaft opened an immense Cornish pump is being erected, which it is expected will greatly reduce the cost of pumping, now done by fifteen or twenty Knowles pumps on the different levels from the surface to the lowest workings of the mine. Sinking this shaft and erecting the pump has occupied about two years, but it is now nearly completed. The tunnel which is being driven from the vicinity of the mill about 7,000 feet to the mine will tap this shaft at the 600-foot level, and not only save lifting the water for that distance, but will enable the ore to be run in cars directly to the mill.

As regards the ore there are no signs of any diminution either in the continuity of the body or in its richness, and the development work is kept sufficiently ahead to show two or three years' work for the present mill in sight.

The mill has been running continuously for nearly six years, and is one of the best and most perfect dry-crushing silver mills that has ever been constructed. The buildings are of frame on brick and stone foundations, and are so located on the mountain side that the movement of the ore through the different steps of reduction is chiefly downward, thus saving expense in handling or in elevating the ore.

The ore is delivered at the upper floor of the mill, where it is weighed and screened, and the larger pieces pass through Blake crushers preparatory for drying. Two rotary driers are employed, from which the ore is fed to the stamps, forty in number, and from thence the pulverized ore is conveyed by an elevator to the chlorination furnaces, two in number.

The roasted pulp passes to the amalgamators, 24 in number, and from thence to 12 settling pans. From 90 to 92 per cent. of the assay value of the ore is obtained, which, for such refractory ores, is considered to be a satisfactory result.

The company intended to build another 40-stamp mill last year, but taking care of the water proved to be a more pressing business. As arrangements for the latter have been completed there is nothing now to prevent the erection of the new mill during the coming year, and it will probably be done.

The following shows the monthly production of the Ontario during 1882:

January	$223,705 76
February	199,713 78
March	231,695 34
April	215,122 33
May	201,771 06
June	215,817 71
July	260,847 46
August	223,336 96
September	173,040 32
October	117,800 45
November	168,456 52
December	178,038 45
Assay value	2,409,346 14

In the immediate vicinity of the Ontario are a number of mines more or less developed, but none brought yet to the producing stage.

The Empire, one mile west of the Ontario, has been steadily exploited and is now down about 400 feet.

The Parley's Park mine adjoins the Ontario on the east; they have sunk 800 feet and are cross-cutting for the vein.

The Lowell has reached a depth of 240 feet, and the mine is reported as looking well. Small experimental lots of ore were shipped with satisfactory results to the owners.

The opinion is entertained by some that the ores of Pinyon Hill are the overflow from vertical veins in the quartzite underlying the lime, and tunnels have been driven into the base of the hill on the east side, which is here very abrupt, with the hope of cutting these veins.

The Sampson is the principal mine operating here. It consists of five claims, on which work has been pushed forward vigorously, and from time to time encouraging indications are met with, tending to prove the correctness of the above-mentioned theory.

There are several other properties in the district, which in time may be valuable, but for some reason, doubtless for lack of means, they are not doing much at present.

In Eastern Utah prospecting for mineral veins has been continued, and a number of locations have been made and mining districts organized. The Denver and Rio Grande Railroad will give additional impetus to mining in this section of the Territory.

The first new district is the *Grand River* district. The western boundary is Green River, and the Denver and Rio Grande its northern line. Its southern boundary takes in the La Salle Mountains, where the prospectors are at work with good results in gold, silver, and copper ore of high grade. The other district is called the *Covington*, Green River being its eastern boundary line. The principal locations made in this district are quartz, free milling. The ledges are large; the quartz is rose color, showing free gold. The first discoveries were made in October, 1881. The quartz of this district resembles that in the Sweet Water mines. These mines are within a few miles of the Denver and Rio Grande road, with plenty of coal, wood, and water in close proximity.

The production of Summit County in 1882 was about $2,500,000 in silver.

WASHINGTON COUNTY.

The silver mines of this county, so far as now known or worked, occur in a sandstone ridge which runs parallel with and at a short distance from the main Wahsatch Range for about 100 miles.

Harrisburg district is the principal mining district, 300 miles south of Salt Lake City, in the Rio Colorado Basin; the ore is sandstone, not differing materially in appearance from that of the country rock. That it contains silver was known as early as 1871, when the district was organized as Union district and sixteen locations or claims were recorded which, however, were subsequently abandoned. The district was reorganized under its present name in 1874, and although shipments of ore were made which gave profitable returns, yet from the general want of confidence in the reliability of the mines, based on the geological formation, and the character of the ore carrying the silver, mills for its reduction were not introduced until February, 1877. Since then the output has been $5,050,099.

In the mines worked the ore is remarkably uniform, both as to quantity and quality, and although geologists differ as to whether the silver came from a process of sublimation or was precipitated from solution, they all agree as to the strong probability of the ore extending to a great depth.

The mines have been consolidated, and are owned mainly by four companies, the Leeds, Barbee & Walker, Stormont, and the Christy, each of which has its own mill.

The Leeds Silver Mining Company was the pioneer of the district. Their mines are the Maynard, Sheppard & Lemmon, Bonanza, and Hanley, situated on the Pride of the West, or White Reef. The property above ground consists of a 10-stamp mill, office, shops, and other buildings requisite for carrying on mining operations. The company was capitalized at $60,000, and after taking out about $800,000 it seemed to reach the end, at least of its producing stage. Various causes are assigned for it, such as the ores becoming refractory, running too low in silver, &c. Bad management has also been suggested, in placing the stock upon the San Francisco boards and manipulating it regardless of the interests of holders, who desired legitimate operations. The probability is that the rich and comparatively free ore-bodies which gave notoriety to the company and to the district became exhausted, and they have been unable to find others equally as rich. The property has lately passed into the hands of its creditors, and the affairs of the company will probably be wound up.

The Barbee & Walker Silver Mining Company owns more than half a mile in length on the White Reef. It has a 5-stamp mill and steam hoist, and during the last five years has yielded about a million dollars. The main incline has reached a depth of 500 feet, and it is reported that the body of ore at that depth, which formerly was only about 22 inches in width, has widened out to upwards of five feet. The product during 1882 was comparatively light, about 100,000 ounces, the workings apparently having been in ore of poor quality. The company is in some financial embarrassment, but it will be only temporary.

The Stormont Company owns the Stormont, Thompson, McNally, Last Chance, Buckeye, and Savage locations. They are opened by two shafts, one striking the vein 560 feet from the outcrop, a vertical depth of 245 feet. The shafts are equipped with steam pump and hoist and safety cages. The workings consist of four levels each 1,500 feet long. The fifth level has been reached by the incline, and there is considerable stoping ground yet standing above the fourth level. The ore is found within a zone from 10 to 100 feet thick, often in association with fossil remains and petrifications of reeds and rushes, and is bounded by red sandstone above and white sandstone below. The deposits vary in length from 50 to 100 feet, are from 100 to 300 feet in depth, and from a few inches to several feet in thickness; sometimes they are connected with each other by feeders or stringers. The workable ore-bodies carry about $30 per ton. One stamp will crush 8 tons per day, and the ore mills as high as 80 to 85 per cent. in bullion 950 to 980 fine. The company has a mill on the Rio Virgin, 6 miles from the mines, run by water and equipped with 10 stamps, 13 pans, and 7 settlers. The cost of hauling ore to the mill is $2.08 per ton, and of milling $3.50 per ton. Surveys were made during the year for running a railway from the mines to the mill, and the estimated cost of the improvement compared with the cost of removing the mill plant to the vicinity of the mines and the substitution of steam for water-power. The cost of mining the ore is extremely variable, between $8 and $15 per ton. The production seems to be steady, with moderate profits. The records show a yield for three and a half years of about 50,000 tons of ore, averaging 22 ounces of silver per ton. The product for 1882 was 233,975 ounces.

The Christy Mining and Milling Company own 280 acres, comprising fifteen locations, thirteen of which form a compact body. The principal locations are the Maggie, California, Stormy King, Tecumseh, and Silver Flat. The first two have steam hoisting works. The ore is sandstone between sandstone walls, and is free milling, mainly chloride. The vein dips from the horizon about 15°. In the Tecumseh, Maggie, and California it has been followed 1,000 feet from the croppings, and is at that point little more than 150 feet vertically below the surface. In five years the company has taken out 55,000 to 60,000 tons of ore, yielding per ton $27.75. Cost of milling is $4.35 per ton; of mining, including development work and hauling ore to mill, $7 a ton. The 5-stamp mill crushes about 50 tons a day. The ore-bodies of the Christy appear to grow better with depth. Prospecting is a long way ahead, and there is ore enough in sight to run the mill two years. The company is a close corporation, and its monthly division of profits is not published, but it is admittedly a generous return on the investment. The product for 1882 was 288,055 ounces of silver.

The silver-bearing part of the reef is known to be 15 miles long, and there is good authority for the statement that there are groups of locations practically unimproved and producing nothing of any consequence, which in all probability are as good as those of the companies named, and which could be bought at reasonable prices, consolidated, provided with a cheap mill plant, and be made to earn dividends. Amongst locations considered valuable, but not much improved, may be named the Lulu, Independence, McKelvey, McMullin, Gisborn, Emily Jane, Vanderbilt, Butte, Stormy King, Gray Eagle, Duffin, Toquerville, Last Chance, Mayflower, Lamb & Steele, Thomas James, Susan, Romulus, Napoleon, Gibfried, and Silver Plume.

The production of Washington County in 1882 was $900,000 in silver.

CHAPTER IX.

ARIZONA.

While the Territory of Arizona remained without means of communication by railroads with the other parts of the country, and was almost inaccessible unless under the protection of United States troops, miners, prospectors, and settlers sought other safer and less difficult fields for exploration in searching for the precious metals; and when its rich mines had been discovered, they could not at first be advantageously worked for want of supplies upon which the miners could subsist, as well as for lack of the means of transportation to carry their ores to the mills for treatment, or their bullion to a market. But the opening up of the Southern Pacific and the Atchison, Topeka and Santa Fé Railroads, connecting this region with the Atlantic on the east and the Pacific on the west, has given an impetus to mining in Arizona that has brought the Territory to the fourth, and will probably bring it to the third rank, as a producer of the precious metals.

The most prominent and at present the most productive district in Arizona is *Tombstone.* The character and relative position of the rocks of this district cannot be described with accuracy, for as yet no geological survey has been published, although doubtless considerable exploration of this region has been made by the geologists detailed for this work.

The prevailing rock is reported to be subcarboniferous limestone overlying quartzite and shale. The mineral beds at Tombstone appear to lie mainly within a belt 2 miles wide and a few miles in length, within which are found dikes of eruptive material, or imbedded between rocks and filled with fissures, in which are deposited rich ores containing silver associated with other metals. The dikes have been described as of three classes: the first, called granite dikes, which are distinguished by crystals of white quartz, exhibiting vitreous fracture; the second, dikes of dark chloride dolorite; the third, feldspathic dikes, consisting chiefly of white feldspar. The richest deposits of the Tombstone are found in the dolerite dikes, which yield both silver and gold. In the mines near Tombstone water is reached below the 600-foot level. The gold can be seen in the ore in scales, and silver is usually present as a chloride or sulphide. The district produces ores of three kinds. In the northern portion are found free-milling ores, consisting of chlorides and carbonates, averaging about $70 to the ton. South of this argentiferous manganese ores abound in limestone, yielding from $10 to $100 to the ton, of which the gangue is from 5 to 20 per cent. silicate, 40 to 50 per cent. manganese, and about 30 per cent. chalcite. This ore is treated by chlorination. In connection with the manganese deposits, carbonates are found in which the ore is siliceous carbonate, carrying about 60 ounces of silver to the ton. In the extreme southern portion of the district the ores contain less silver, but an average of 30 per cent. of lead. The predominating minerals are argentiferous cerusite.

The prevailing rock south of the third division is feldspathic porphyry of a spotted-like gray and brown color. Adjoining the town site the veins are narrow, and range from $80 to $900 per ton in the Bonanza and Winfield mines. The Grand Central, Head Center, and Tranquillity are located upon the second or doleritic dike, the ore from which averages about $10 to the ton in gold, and over 2 per cent. of lead.

Some of the productive mines of the district are located entirely within the limestone at a distance from and apparently not connected with the dike, while other mines have vertical veins which are known to form a part of it.

The mines of Cochise County, in which Tombstone is situated, yielded over a million of dollars more than the previous year. But in Pima, owing to the reduced production of the Harshaw and other mines, $600,000 less was obtained, while Pinal County falls off $350,000.

The net increase in all the counties was about $200,000 in silver, with scarcely any change in the amount of gold.

From a careful comparison of returns made by the principal mining companies, reports of shipments by express and railroads, from smelting and reduction works, and receipts of bullion at the mints and assay offices, I have estimated the total production of the precious metals in Arizona during 1882 to have been $8,565,000, of which $1,065,000 was gold and $7,500,000 silver. These amounts were produced in the several counties of the Territory as follows:

County.	Gold.	Silver.	Total.
Cochise	$600,000	$5,200,000	$5,800,000
Gila	50,000	470,000	520,000
Graham	10,000	5,000	15,000
Maricopa	250,000	75,000	325,000
Mohave	15,000	50,000	65,000
Pima	70,000	150,000	220,000
Pinal	20,000	900,000	920,000
Yavapai	30,000	400,000	430,000
Yuma	20,000	250,000	270,000
Total	1,065,000	7,500,000	8,565,000

The following review of the mines and mining industry of the Territory was prepared by Mr. A. M. Lawver, of San Francisco, who visited the principal mining districts and personally examined the chief mines:

No other mineral region of the United States has made greater progress in development than Arizona within the past two years. The discovery of the bonanzas of Tombstone created an excitement in mining circles similar to that when the Leadville carbonates and the Comstock lode disclosed their treasures to the world.

Nature has been prodigal of her favors to this portion of the United States in bestowing a health-giving climate, pure air, invigorating mountain breezes, and treasures in the precious and other metals, gold, silver, copper, lead, iron, and coal, the production of which, though in its infancy, already contributes largely to the national wealth. The Territory covers an area of 72,000,000 acres, nearly one-half of which is mineral-bearing. Its mountain ranges extend through the entire Territory, in which are found nearly all the metals known. Cinnabar, tin, nickel, and platinum constitute a portion of its wealth. In the Hacimiento Desert are found many deep-red garnets. Beds of gypsum and salt deposits are in the vicinity of the Dragoon Mountains and in other localities. These facts, in connection with assured safety from Indian depredations, are securing a large immigration and a healthy inflow of capital. In every portion of the Territory there is general activity, not only in the opening of mines, but also in the erection of machinery for the milling and reduction of ores.

In Cochise County, with its many rich and productive mines, such as the Contention, Grand Central, Tombstone Mill and Mining Company, Head Center, and others, together with the developments now in progress under the water-level, a permanent prosperity has been established. In Pima County its Total Wreck and in Pinal County its Silver King are yielding regularly large amounts of silver. In Gila County, MacMorris, a gold-producer, and other mines are each year improving. In Maricopa County are the Arizona Central gold mines, the Rover, and the famous Gunsight. Yavapai County has its Tip Top, Tiger, Black Warrior, Peck, Silver Belt, and Occident mines, all producers. Southern Arizona has hitherto had the advantage over the northern portion in its railroad facilities; but the Atlantic and Pacific, now traversing the northern part, is aiding in the rapid development of its mineral resources, the railroad being within easy distance of the best mining camps. Some agricultural land, cattle ranges, and an abundance of timber add to the future prospects of that portion of the Territory. Miners have been gradually acquiring a thorough practical knowledge of mining as a science in all its branches, and are fully informed as to the peculiar nature of the various kinds of ore and their special treatment. The Territory is rich in copper ledges, which are found in all portions, the output of this metal for the year being over $3,000,000 in value.

The Tucson Star publishes the following statistics in relation to the principal production of Arizona mines in 1882:

Silver and gold output of 1882.

OUTSIDE DISTRICTS.

Silver King, silver bullion	$375,000 00
Silver King, silver concentration	440,000 00
Tip Top, silver	243,081 00
MacMorris	281,024 00
Pioneer	33,763 00
Arizona Central, gold (estimated)	425,000 00
Silver bullion shipped from Pima per Wells, Fargo & Co	76,109 80
Gold bullion and dust shipped from Pima, per Wells, Fargo & Co	75,208 20
Silver bullion shipped from Yuma, per Wells, Fargo & Co	13,369 00
Gold bullion and dust shipped from Yuma, per Wells, Fargo & Co	14,472 00
Ore shipments via Yuma	54,106 53
Ore shipments via Casa Grande	22,500 00
Total	2,054,133 53

TOMBSTONE DISTRICT.

Contention	1,680,542 13
Grand Central	1,358,820 35
Stonewall (eight months' run)	240,000 00
Boston Mill (custom)	165,000 00
Girard Mill and Mine (and custom)	177,540 00
Tombstone Mill and Mining Company	1,440,894 06
Head Center (eight months' run)	125,079 81
Watervale Mill (two months' run)	15,000 00
Total of Tombstone	5,202,876 35
Total of outside districts	2,054,133 53
Estimated output not reported	1,500,000 00
Grand total	8,757,009 88

COCHISE COUNTY.

This county occupies the southeastern corner of the Territory. Its surface is much diversified with mountains, hills, broad mesas, and level valleys. In the valleys along the San Pedro there is excellent grazing.

The wonderful mineral developments of the past two years have almost entirely absorbed incoming capital and labor.

Gold, silver, and copper abound in unlimited wealth, and the bullion output of this county exceeds that of all the rest of the Territory.

The mining industry is in the hands of a class of sturdy men who fully understand their calling and who make few mistakes. When their labor shall have added the now partly-developed mines to the present list of producers, one can hardly exaggerate in approximating the value of the resulting bullion output.

The Atchison, Topeka and Santa Fé Railroad has, during the year, completed a branch line through this county, thus giving a shipping point to Tombstone, at Contention, 10 miles distant.

Tombstone district is the bonanza camp of the Territory, it having produced since its discovery four years ago over $13,000,000. The district is in a more prosperous condition than ever before. The ore shown in all the leading producing mines is greater than at any time since their discovery, and the bullion output is greater. The successful completion of the Huachuca water-works is an important factor in the increased and permanent prosperity of the district.

The development of the mines below the water-level has infused new life into the district and is attracting capital from quarters seeking investments in its mines. The average monthly output of this district for the year has been nearly a half a million of dollars, which is not now equaled by any other district in the United States, save that of Leadville, Colo.

Prof. William P. Blake, in his discussion of the geology of the veins of the Tombstone, mentions beds of limestone, shales, and quartzite, the outcropping edges of which had been exposed in many places by erosion. These beds in the central part of the district are thrown in a series of wave-like flexures, which may be traced in some cases upon the surface, and are seen to the best advantage in the drifts and crosscuts of the mines. The quartzite and shales he considers of deep-sea origin, as they show signs of a granular structure. The quartzite is very hard and passes imperceptibly into layers forming beds of siliceous limestone, organic in its origin, and appears to be a fine sediment totally different from the quartzites with granular structure in the upper strata. It rests upon doleritic limestone, and is regular and evenly stratified for a thickness of 140 feet, and contains an abundance of pyrites disseminated through the layers of rock in fine crystalline grains. This bed is described by him as a novaculite or honestone, and he states that above it are found beds of dark black or blue limestone, and dark-reddish alternating with black siliceous shales, and that the black limestones are the chief repositories of the bedded masses of rich silver ores. These formations have been distributed and uplifted and broken apart in places and rent with fissures, and the explorations of the mines show frequent faults and disjointed outcroppings of limestone beds. The Grand Central and Contention claims are located upon a dike or fissure, varying in width from a few feet to 70 feet, carrying ore with it and alongside of it, and running in a northern and southern direction, cutting indiscriminately through shales of quartzite and limestone. The harder parts of the dike are the most prominent. The contact with the abutting edges of the disrupted beds is not always marked by any great change in their appearance or composition, though in places there are obscure metamorphism, impregnations of silica, and some modifications of structure. The dike itself has a distinct vertical lamination or structure through most of its substance, and is more or less penetrated by veinlets of quartz. In some portions it is highly crystalline and nearly barren, and in others consists chiefly of a feldspathic base, in which the feldspar crystals are obscure. It passes into a felsite, which, in the decomposed portions of the dike, and when slaty in structure, might be mistaken for the partly decayed shales or quartzite.

Large portions of the dike are so penetrated by quartz as to consist largely of it, and might be called quartz, although close examination will show the presence of feldspar.

The Epitaph says: "If the Contention fissure, upon which the Grand Central is located, is of igneous origin, as asserted by Professor Blake in his paper on the 'Geology of Tombstone,' read before the American Institute of Mining Engineers, then there can be no question of the lode going down, and that, too, with a probable increase in size and strength. Thus far the developments in Grand Central substantiate this view of the case, the ledge so far developed on the 600 level being stronger than at points nearer the surface.

"The question of the continuation of the ledge downwards being settled in the affirmative, the next question is as to its probable ore-bearing qualities. For a solution of this last and equally vital point we are compelled to draw our conclusions from analogy. Looking over the broad field of mining, the world over, we find that where true fissures have been subject to extensive operations the ore has been found to make with the ledge, in variable quantities, it is true, to the utmost depth attained upon them. Another fact to be taken into account is the manner of occurrence of ore laterally within these fissures. It is a well-known fact that the paying bodies are found in chimneys or chutes of ore of variable lengths, often separated by long intervals of barren ground. Thus, too, in depth these ore-bodies are found to have a limit succeeded by barren vein matter. Take the Comstock as an illustration. The surface bonanzas commenced upon the north with the Ophir; thence going south came the Gould & Curry, Chollar, and Gold Hill mines. The deep bonanzas were California, Consolidated Virginia, Savage, Hale & Norcross, and Belcher, being sandwiched in between the lesser surface deposits. That a similar condition of occurrence of the bonanzas in the Contention fissure will be found we have every reason to believe, and that the utmost limit of production will be reached before a depth of 1,500 to 2,000 feet is attained is hardly probable. What may be found below those points, nothing but persistent work will tell."

The Tombstone Mill and Mining Company have succeeded in the experiment of using the manganese present in the ores of the district as a flux for melting tailings, which will be of immense benefit to the camp in the increase of its bullion production.

The majority of the ores are impregnated with black oxide of manganese, iron, and silver. The following mines carry from 10 to 250 ounces in silver to the ton, and their ores have been successfully treated by amalgamation after first roasting: Stonewall, Randolph, Contract, Eagle, Wedge, Prompter, Lucky Cuss, Bunker Hill, Green Cloud, Mattie Hickey, Big Pedro, and some others.

Recently the Gird mill, at Charleston, was fired up, using manganese as a substitute for iron, as an experiment before untried, which resulted in a perfect success. The slag from the furnace, when everything ran smoothly, only gave one-half ounce of silver to the ton, and when clogged by the inefficiency of the feeders, 2 ounces. The bullion assayed $400 per ton in silver and 2 ounces in gold. This makes the bullion, counting the unrefined lead at 4 cents per pound, worth $520 per ton. Their output from Monday morning up to Thursday evening, running at half capacity, was 10 tons of bullion, having a gross value of $5,200.

This success opens up a far brighter future for the district than any event since the successful dropping of the first stamps in the Gird and Contention mills. Both carbonates of lead and manganese abound, with large amounts of very rich chloride and horn silver ores, which can be more economically treated by smelting than by any other process, all other things being equal. The rich Way Up, Virginia, Ingersoll, Luck Sure, Little Devil, Bonanza, and Winfield ores are of this type. All the bullion can be taken out by smelting where the fluxes are so perfect as here.

Previous to 1882 the Tombstone district labored under great disadvantage for want of an adequate supply of water for mining and milling purposes. This has been remedied during the present season by bringing from the Huachuca Mountain, 25 miles distant, an abundant supply for the present and for the future. The cost is said to have been upwards of half a million of dollars.

The following, from the Tombstone Epitaph, will give some information in regard to this stupendous enterprise:

"In the Huachuca Mountains is a fountain of waters that come welling out of the sides of the mountains, pure, sparkling like crystals, and cold as ice, gathering themselves into a brook in the center of the cañon, sinking and rising, until at last they leap forth into the reservoir that has been excavated in the solid granite, where they fill a basin quadrangular in form and 20 feet deep.

"The dam that spans the cañon and impounds the water is 100 feet long and 20 feet deep upon the inner side, built up of rubble work above the rock foundation, 60 feet broad. This is faced in the reservoir with one foot of cement, covered next to the water with 2-inch plank. The south side of the reservoir is 110 feet long at the surface, the other two sides being about 80 feet each; thus forming, as before stated, nearly a square or quadrangle reservoir. Its holding capacity is 1,000,000 gallons. In order to prevent any possible flooding by the copious rains the mountains are subjected to in the summer months, a flume 8 feet wide and 3 feet deep has been constructed from below the dam on the south side, extending above the upper end of the reservoir about 160 feet, to where a wing-dam of rocks meets it, both abutting against the large trunk of a sycamore tree that stands in the center of the cañon, where the creek makes a sudden bend to the south; thus deflecting the full force and volume of the current into the flume, which will carry away any flood that may occur, other than an absolute cloud-burst, against which no human foresight and ingenuity can guard. The grade of this flume is one-half inch to the foot, which will send the water with the velocity of lightning.

"Here, then, in this rock-ribbed reservoir is caught and impounded the crystal spring water that from this time henceforth is to form the supply of the city of Tombstone and the surrounding mines. At the base of the dam the large 7-inch main enters and extends up near the center, where a large, strong iron strainer admits the water to the pipe. The flow is regulated below the dam by a screw valve, where much, little, or none may be allowed to flow. Here starts the 7-inch pipe that extends in an unbroken line from the cañon, across the plain and up over the rolling mesa and low hills, to the distributing reservoir back of the Grand Central mine, a distance of 129,000 feet, or 25 miles.

"At 2,000 feet below this main fountain, a 3-inch pipe joins the main line, that takes the water from a spring 1,800 feet up a lateral cañon. At 4 miles below, at what is called the 'Y,' a 5-inch main, 4 miles long, brings the water from Carr's Cañon, which furnishes 250,000 gallons per day. Here the system of catchment is the same as described above, only on a smaller scale, the stone reservoir being 15 by 30 feet and about 10 feet deep. The altitude of the reservoir is 100 feet greater than the Miller, or 2,000 feet above the San Pedro River. The water here is equally pure, cold, and soft as that from the two other sources of supply.

"The minimum flow into the Miller Cañon reservoir is 400,000 gallons daily. That from the Gird Spring, which comes into the main at 2,000 feet below the reservoir, through 1,800 feet of 3-inch pipe, is 100,000 gallons, and that from the Carr Cañon, at 4 miles down, through 4 miles of 5-inch pipe, is 250,000 gallons per day. In addition to this, and to be drawn upon in the future if necessary, is the McCoy Spring, that flows 150,000 gallons. These estimates are under rather than over the actual amount at the time of the lowest water, about the 1st of July.

"The ditch was dug 27 inches deep, so that when the pipe is covered there are 20 inches of solid earth above it, which insures its arriving at its final destination nearly as cool as at the fountain-head. The course from where it leaves the mouth of the cañon is almost an air-line to the Lucky Cuss Hill, where it deflects to the east until it reaches the reservoir. At the San Pedro, 1,900 feet below the fountain-head, and 800 feet below the reservoir in Tombstone, a blow-off valve was put in, so that the pipe may be emptied of its contents and thoroughly flushed of all sedimentary deposit of earthy matter.

"The distributing reservoir, the crowning glory of this gigantic work, is located on the hill back of the Grand Central hoisting works, at an elevation of 365 feet above Toughnut and First streets. The reservoir was excavated 20 feet deep into the solid rock, and is 90 feet long by 80 feet wide, with a capacity of 1,100,000 gallons."

The Contention Consolidated Mining Company is the leading producer in the district. The Flora Morrison and the southeast half of the Sulphuret belong to this property. A rich body of ore has been discovered in the south drift of the 600-foot level. This is the greatest depth from which ore has been raised in this camp, and it is evidence tending to show bodies of ore at the same depth in other mines on the same ledge. This discovery is on the water-level. It is the opinion of experienced miners and competent geologists that the principal wealth in the mines of Tombstone lie underneath the water-level.

The quality of ore discovered is of a very high grade, containing large visible sheets of native and horn silver, and considerable gold, assaying as high as $19,000 per ton. This strike was simply the cutting at a point some 400 feet distant and north of a point where the same vein had been cut and reported several months ago. Its significance is very great. It shows the continuity of the vein in a horizontal line for a long distance, and by natural deduction for the whole length of the lode that has been worked on the upper levels. This development is at a point 28 feet above water-level, and shows the change in the character of the ore that has already been anticipated by those best informed. It is at this point largely sulphide and will become massive as depth is attained upon it. It is believed that this development will insure a profitable level on the 600. As yet sufficient work has not been done to demonstrate more than the finding of an ore-bearing vein in vertical and horizontal continuity. It is admitted at the mine that its significance is very great as affecting the future prosperity of the district.

This company, in connection with the Grand Central, has taken steps to develop the mine below the water-level, as noted in the description of that mine. There is more ore in sight to-day than its 20-stamp mill has power to crush in two years.

Some very rich ore has been opened in the 200-foot level.

Everything in and around this prosperous and well-managed mine is in excellent order. There is much prospecting, the drifts are being driven with rapidity, and the stopes are yielding a daily output of 75 tons of ore.

The Flora Morrison shaft is now down to the 600-foot level of the Contention old works, and they are now opening out the station. As soon as the station is completed a cross-cut will be run under the stopes above, and prospecting work will be pushed both north and south on the ledge, when important developments may be looked for. The cross-cut from the 500 station has been connected with the 500 level, and they are now driving south to connect with the Grand Central. The ore remains about the same grade.

The yield of the Contention for the year is as follows:

January	$121,886 33
February	128,726 01
March	148,704 15
April	126,152 69
May	116,820 03
June	166,041 22
July	148,017 43
August	154,511 64
September	152,173 74
October	139,328 39
November	144,226 84
December	133,766 31
Total	1;678,354 68

The Grand Central Mining Company is one of the leading producers in the district. In regard to this mine the Republican says:

"Descending to the 300-foot level, we were conducted 300 feet to the south, where a cross-cut, being continued west, was then into the ledge 12 feet, all the way in ore, of which the car samples taken the day before gave a value of $60 in gold and silver, with no sign of a hanging wall. This, unlike anything ever before discovered in the mine, is a highly sulphureted ore contained in a matrix of close-grained quartz of a dull ash color.

"In fact, there was a change coming in, showing an oxidized ore closely resembling that from other parts of mine. When the hanging wall is reached, drifts will be run both north and south to develop extent of find, and a winze will be sunk to 400-foot level.

"Coming back to shaft we ascended to 200-foot level and again went south 500 feet, where same ledge has been cross-cut and drift run both ways for a considerable distance, showing a strong, well-defined ledge, carrying large amount of good ore, some of which assays very high. Here a chamber is being cut and timbered, where winze will be started for 300-foot level, where a drift will be run along ledge to connect with winze, which will not only develop ore-body, but give ventilation to that level. Before coming to ledge, the old Naumkeag shaft was passed, it having been sunk on a spur of main ledge down to this level.

"As soon as chamber for winze is completed, stoping will commence on this ore-body. Stopes in north end of mine are looking well and yielding as heretofore. The nature of discovery in south end of this mine is such as to justify assertion that it gives the company a new mine of equal if not greater value than the one they have been working at north end for last two years. It is believed that this discovery is beyond and independent of system of faulting, which has taken place in northern portion of ledge, and that it may be expected to continue downwards in unbroken continuity to lowest depths, and in consequence that the ore will be much more regular than at other points where explored. The drift on 600 level to connect with the Contention 600 level is being pushed as rapidly as possible, and when connection is made, new works for going below water-level will be inaugurated."

A singular feature is the large increase of gold in the ore, which ranges from $85 to $112 per ton. If this should continue it will make this mine more noted even than it has been in the past.

A 12-foot ledge of good milling ore has been struck in the drift running to connect with the Naumkeag in ground never before prospected. A cross-cut has been started from the 200 foot level to investigate the new find on the boundary line between this mine and the Contention.

The Grand Central sympathizes with every movement in the Contention. There is no doubt but that the vein of ore cut on the 600-foot level of the Contention will be found in this mine, when the cross cut penetrates sufficiently west to catch the strike of it. The station for the 600-foot level is completed, and sinking is resumed. At the old shaft, the drift from the 600-foot level intersected the ledge at a point 280 feet west of the shaft. The ledge at this point is strong, and carries an increased percentage of gold over the upper levels. This is considered a good sign. The stopes are all looking and yielding well. The ore, too, is of a better quality. The water problem is being solved by this company and the Contention placing two powerful pumps in the old works of the Grand Central, each of which will throw a 6-inch stream. The water is to be pumped to the 600-foot level and thence run through the level connecting with the Flora Morrison, and from there hoisted to the surface. The ore reserves in these two mines are sufficient to insure the usual dividend for another year, before which time they can be thoroughly prospected below the water-level, where the indications of still richer ore are more flattering.

Tombstone Mill and Mining Company, which comprises the Tough Nut, Good Enough, Lucky Cuss, Defense, Survey, Tribute, West Side, East Side, East Side No. 2, Owl's Nest, and Owl's Last Hoot mines, and two mills located at Charleston, with a 35-stamp capacity, is one of the largest mining properties in the Territory. Its bullion output for the year was $840,000.

The West Side is furnishing much good ore for a true fissure, cutting shale and quartzite alike in its passage through the country. It has good walls and stands nearly vertical, with a strike nearly north and south. Ore is better on the third level than on the first, and from the nature of the vein and formation there is small fear of its faulting in its downward course. Ore is one of the freest possible, having little iron or lead and no zinc or antimony to debase bullion and cause loss in working.

Silver is mostly contained in chloride and horn silver, and will work up to a very high percentage. There is a strong probability that the main hoist that now stands idle on Good Enough mine will soon be removed to the West Side, where a large working shaft will be sunk.

This is a most important development for the district as well as for the company.

The Lucky Cuss is developed largely in 40-ounce manganese, which is used as a flux in the company's smelter at Charleston.

The Tough Nut and Good Enough mines are steadily producing ore.

The output of ore from this group of mines is some 60 tons per day.

To describe all the workings of this immense property would require more space than can be accorded in this report, and as the mine is already so well known, it is not regarded necessary. The following from the Mining Record will convey some instructive information in regard to this mine and the manner of treating its ores.

Prof. John A. Church, superintendent of the Tombstone Mill and Mining Company, issued a report for the year ended March 31, from which it appears that the mines of the company produced during the year 29,211.66 tons of ore, yielding 1,390,763 ounces of crude bullion, or 1,198,118.92 ounces of fine silver, and 2,462.84 ounces of fine gold, having together an approximate value of $1,376,047.13. The average yield per ton was 41 ounces of silver and 0.084 ounce of gold, having a total assay value of $54.76, and, deducting 15 per cent., an estimated market value of $47.34 per ton. The total production of the mine, and the average, as per mill returns, are given as follows·

Period.	Tons of ore.	Total.		Average.		
		Gold.	Silver.	Gold.	Silver.	Total value.
		Ounces.	*Ounces.*	*Ounces.*	*Ounces.*	
June to September, 1879	2, 025	284. 86	129, 215. 81	0. 140	63. 81	$85. 39
October to March, 1879-'80	3, 733	450. 60	137, 375. 06	0. 121	36. 80	50. 08
March to September, 1880	7, 242	745. 70	392, 017. 11	0. 103	54. 13	72. 14
October to March, 1880-'81	9, 363	1, 099. 42	474, 831. 77	0. 117	50. 71	67. 98
March to September, 1881	12, 229	1, 275. 54	607, 232. 36	0. 104	49. 66	65. 35
October to March, 1881-'82	16, 983	1, 187. 30	590, 886. 56	0. 070	34. 79	46. 42
Total	51, 575					

Assuming that the extraction of the silver in the mill was 80 per cent. and of the gold 50 per cent., it would follow from the average of the product that the average gross value of the ore obtained from the mine was $73.05 in silver and $4.06 in gold, a total of $77.11.

The ore contains, besides, from 4 to 8 per cent. of lead. According to detailed monthly statements accompanying the report, the average fineness of the bars produced was 8.61 of silver and 1.7 of gold, the average percentage of base metal in the bullion being 13.72 per cent., the maximum being 25.9 per cent. in March and the minimum 9.6 in January, 1882.

The total expenses during the year were $794,170.90; in these, however, are included $99,758.69 of extraordinary expenses ($20,365.64 legal, $32,651.87 mine construction, and $30,590.83 mill construction), and an estimated increase in the stock of supplies of $16,000, leaving the total outlay for work and materials at $684,412.21, and making the direct cost for mining and milling $23.43 per ton for the whole year.

This cost is distributed as follows:

For what expended.	April to September, 1880.	October, 1880, to March, 1881.	April, 1881, to April, 1882.
MINING.			
Labor	$13 16	$9 50	$11 03
Contract	......	39	21
Supplies	2 22	2 12	2 16½
Repairs and renewals	02	....	01
Ore hauling	3 17	3 10	3 13
Total mining	18 57	15 11	16 54½
MILLING.			
Labor	$3 11	$2 68	$2 85½
Supplies	3 13	2 87	2 97
Repairs and renewals	22	68	48
Total milling	6 46	6 23	6 30½
SUNDRIES.			
General expenses	$0 59	$0 41	$0 47
Administration	64	61	64
Total sundries	1 23	1 02	1 11
Grand total per ton	26 26	22 36	23 96

Professor Church's account of the condition of the mines is a favorable one.

The Combination ore-body, discovered in May, 1880, which is cut by the end line separating the Good Enough from the Vizina, has already yielded from 16,000 to 17,000 tons of ore, and may yield 8,000 to 10,000 tons more. The ore-body in the Tough Nut 160 level is irregular, and the amount available cannot be exactly estimated. It is believed, however, that it will supply ore for some months to come. Professor Church adds that "if facilities for working low-grade ore are ever provided, this ore-body can supply several thousand tons."

Some hundreds of tons of ore were extracted from the surface at a new outcrop, discovered by calculating the rise of the ore-chute on which the lower part of No. 2 incline, Good Enough mine, is excavated. This is considered important, "for the reason that it gives a clear and unbroken ore connection from an outcrop in the center of the Good Enough claim, down to the only point where our works have crossed the line of the Way Up mining claim on ore." On the 160, 200, and 250 foot Good Enough levels important bodies of ore have been opened, and a mass of ore 26 feet thick was found in the east end of the 160-foot level.

Professor Church has been particularly active and successful in putting the handling of ore below and above ground into good shape, and he gives the following figures to show the marked reduction in the quantity of labor per ton of ore, including the labor of the entire force connected with the mine in any manner:

Labor per ton of ore.

	Days.
April, 1881	4.6
May, 1881	3.7
June, 1881	3.5
July, 1881	3.1
August, 1881	3.5

	Days.
September, 1881	2.5
October, 1881	2.86
November, 1881	2.84
December, 1881	2.65
January, 1882	1.97
February, 1882	2.08
March, 1882	2.19

In the mills important changes have been made, the Corbin mill now being wet-crushing, and the Gird mill having five new stamps and an engine. Concentration works have been built at the Gird, and a new retort house at the Corbin.

By screening the fine stuff from the rock coming from the rock-breakers, and not sending it to the stamps, the quantity of ore treated in the latter has been increased by 12 to 15 tons per day. This, in addition to other changes, has run up the capacity of the mills from 60 to 100 tons. Professor Church abandoned the use of chemicals, and found no difference in the amalgamation, until the month of March, when the Tough Nut ores fell off in milling qualities. After various trials, it was found that the percentage was restored by adding bluestone and salt. Professor Church attributes this change to an increase of iron oxides and sulphides, and of manganese oxides in the ores. A matter of the greatest importance is the question of working the tailings, concerning which Professor Church says:

"The company now has about 50,000 tons of tailings at the mills, and these contain probably $15 worth of silver, gold, and lead per ton. An effort to utilize them was made early in my administration, but was not successfully carried out until last fall. As the result of the experiments, six Frue vanners have been placed in the Gird mill, and about 8 tons of concentrates are obtained daily. The value of the concentrates is about 20 per cent. lead and 50 to 75 ounces of silver per ton. About 55 per cent. of the value of the tailings is obtained in the concentrates; but this will shortly be materially increased by separating the battery slimes from the tailings, and by concentrating the pan slimes by themselves. The result of our trials convinces me that in a mill built for the work at least 75 per cent. of the silver in tailings can be recovered, when the ores contain from 4 to 6 per cent. of lead.

"The method of operation is as follows: From the settlers the tailings run to an agitator, the purpose of which is to make the supply to the tables constant; thence to the Frue tables or vanners, where the valuable portion is separated, and the tailings thence now run to waste.

"The next step will be to raise these tailings to a water-separator, where the fine slimes will be separated from the sands, and the former will be concentrated in buddles.

"The material which we are endeavoring to concentrate consists of sands, pan slimes, and battery slimes, mixed. The battery slimes consist of that portion of the ore which is stamped so fine that it will not settle in the tanks. This portion of the ore has always escaped treatment, and has been a loss hitherto. In the new treatment it is intended to save it all. The pan slimes are formed by the grinding in the pans. They have lost the greater portion of their silver by amalgamation, but are too fine to work well on the concentrating tables. Experiments already made show that they can be successfully concentrated in buddles. It is not necessary to carry this concentration very far, as a certain amount of the clayey slimes are needed to give the sandy concentrates the proper consistency for holding together in the furnace."

Two sample bars of silver lead were produced from the concentrates, one containing 3.13 ounces of gold, 265.22 ounces of silver, and 98.2 per cent. of lead, and the other 2.93 ounces of gold, 310.06 ounces of silver, and 97.8 per cent. of lead. How many tons of tailings will produce a ton of bullion is not stated.

The Dean Richmond mine is looking well. Its ledge widens with depth and becomes more clearly defined, and the quality of the ore improves. Cross-cutting is being done at the bottom of the old shaft, which is 100 feet deep, in a ledge 8 feet wide, in ore that mills $65 per ton. This mine was formerly the old Bronco mine, and in disputes over the title sixteen men have at various times lost their lives. It is regarded as a very valuable property.

The Bloodhound mine, located near Charleston, is said to be looking exceedingly well. It is the second extension of the famous Bronco, or Dean Richmond mine. Three shafts of 15, 10, and 8 feet have been sunk along the ledge, revealing a well-defined ledge of carbonate ore varying from 2 to 4 feet in width. Average assays run over a hundred dollars.

The Empire mine is turning into a veritable bonanza. The stope in the 450-foot level is in a large body of mineral-bearing horn silver, which is the same as that on the 400-foot level. There are some 8,000 tons of high-grade ore in sight, assaying $210 in gold and $320 in silver. The north drifts from the 400 and 500 foot levels, now in 600 feet, are very similar. The west drift from its 450 foot level is in hard lime rock, with indications of ore. The winze from the 450-foot level is down 40 feet, and is in water. The ore at the water level and below it is very rich. This is 490 feet from the surface. The work is principally confined to the 300, 400, and 450 foot levels. There is enough good ore in sight to keep a 20-stamp mill, which will soon be erected, running for three years.

The Little Devil mine is one of the most promising in the district. The main shaft is down over 100 feet. Drifts are made at a depth of 75 feet in ore which assays $2,400 per ton. The ore on the dump surpasses in richness anything seen by the writer in this camp. It is being treated by the Head Center mill, and is now added to the bullion-producing mines. It is the intention of its owners to erect a mill during the coming year.

The Vizina Consolidated shows an increased production for the year. Of this mine Mr. H. B. Clifford, a noted expert, reports that "some of the finest ore ever extracted from the mine was found at 260 feet in depth, and I have every reason to believe that the ore will continue through under the first stratum of the Vizina, but it will be found deep, as a natural raise of the formation will carry it down to at least 500 feet; that the ore exists under the first stratum is evident from the surrounding developments, and if the entire ground is stratified, as all of the developments in the camp have shown, then the intrinsic value of the Vizina mine can never be accurately estimated. Taking it as a whole, the Vizina property bids fair to be very productive and prove a source of great revenue to the stockholders, and if its ore-bodies improve as they have from the beginning, the expectations of the most enthusiastic will be realized. There is ample ore in sight to pay all mining expenses and dividends for a long time to come." The main cross-cut westerly on the 400-foot level is now in 325 feet. The drift at 300 feet is in porphyry, and is now in 185 feet from the main shaft, and near the 400-foot level, with which it will soon be connected. Good progress is being made in drifting, stoping, and winze-sinking. The prospects for a big property with depth are very encouraging.

The Stonewall mine is having a new double-compartment working shaft sunk, which is now down 150 feet. It is not expected that it will reach the ledge under 200 feet from the surface. New hoisting works are being erected. Its main shaft is down 300 feet. The west winze in the 150-foot level is down 150 feet in good ore. The south cross-cut in this level is in 160 feet in a rich streak of ore. The tunnel west of the shaft is in 200 feet, mostly in ore. Work is going on with energy in the tunnel, shaft, drift, winzes, and stoping. Sixteen tons of ore are shipped daily to the Boston and Arizona Smelting and Reduction Company, now the owners of this valuable mine. The average of the ore crushed has yielded $80 per ton.

The Fair Villa mine has a shaft down 160 feet, with good ore in the bottom. There are levels at 100 and 160 feet, from which 5 tons of ore are raised daily. The vein in the south drift on the 100-foot level is 5 feet wide. At 35 feet in this drift a cross-cut west has been made through a vein of 5-foot ore, making a ledge of over 11 feet wide between walls; both walls, well defined, showing a true fissure, the trend of the ore-body making southward toward the Brothers mine. A winze has been started on this ore-body. It is expected that 15 tons of ore will be raised daily ere many days. This is a promising property.

The Ingersoll Consolidated has been added to the list of bullion producers during the year. The Epitaph gives this description of the mine:

"The shaft is down 297 feet; the drifts run nearly east and west and consist of five levels, respectively 40, 80, 122, 220, and 297 feet from the surface, and a long incline which, beginning 60 feet from the shaft in the east drift, has a length of 320 feet, pitching at an angle of 30 degrees, the termination being a little over 200 feet from the eastern end of the mine and about 250 feet from the surface. The big producing chimney of this property must come close to the surface in the croppings about 100 feet to the west of the shaft, judging from the pitch of the ore at the 40-foot station where it first appears in strength, and at which point the first west drift begins, cutting through the dip of the ore to the east, which shows strong all the way to the end and in the face 50 feet from the shaft. On the 80-foot level the west drift is in 20 feet, and at its terminus is connected by an upraise through ore with the 40 foot drift above; east from the shaft this drift is run as a level for 60 feet, at which point it takes the form of the incline above mentioned. The entire length of this level, counting the incline, is 400 feet, and it is in ore its entire length. While the ore-body is very strong the entire distance, it is remarkably so for the first 40 feet of the incline, as well as for a like distance below a point 200 feet down, the body here being of unknown extent, a cross-cut just commenced (in 8 feet) to the north being entirely in ore. Ninety feet down the incline cross-cut to the south is in 20 feet in ore.

"At a depth of 140 feet down the incline passes on its south side line within 6 feet of the old Blue Monday main shaft, with which it has been connected (160 feet from the surface), for the purpose of ventilation. Stepping through the connection on to a platform in the shaft, the Ingersoll ledge shows strongly clear across, evidencing that it has a strength to the south of the incline at this point of at least 12 feet. Down the incline 200 feet a south-southwest upraise is progressing, the face of which clear across, at a distance of from 60 to 65 feet from commencement, is in a 7-foot stratum of high-grade ore. Thirty-five feet up this stoping a second connection has been made with the Blue Monday shaft, and a few feet further on a large body of rich antimonial ore glistens in a side stope. One of the peculiarities of this character of ore in the mine is that although it has been found in several places in this incline workings, it has always and only been discovered in prospect cuts that have been made to the south, and never to the north side. At the terminus of the incline, the ore takes a decided pitch, increasing to 60 degrees.

"Owing to the long distance of windlassing, the incline at this point has been discontinued until such time as steam shall be called into requisition. One hundred feet down the incline the 122-level drift runs back to the shaft, a distance of 156 feet, and through this drift the buckets that are drawn up on cars from below by windlass are run to the hoist. While the lower drifts from the shaft are very promising, the big showing of the mine is in the 80-foot level and incline, and, though the latter has been made large and roomy, averaging 6 feet in height by certainly 15 feet in width, affording ample room for passing back and forth on either side of the car-track, the ore appears strong on either side, stretching off in blanket layers of from 2 to 4 feet thick in the intervening limestone.

"The accumulation of ore upon the dump has all come from the prospect works above described. It will be seen from this that there are immense reserves now in sight to draw upon while prospecting continues to a greater depth."

This mine is in a fine condition, the ore being extracted from the 300-foot level in high grade, some of which has been shipped to the smelter at Benson as an experiment, which cannot fail to bring a large return. The ores from this mine have been treated at the Boston mill, at Charleston, and at the Girard mill, which is very near the mine.

The San Pedro mine is being thoroughly developed. The northwest drift on the 205-foot level is in 100 feet, in which two veins of ore have been cut from 1 to 2 feet wide. They both dip to the southwest at an angle of 45°. On the left side of this drift there is a vein of ore 2 feet wide that dips southwest. On the 20-foot level from the main shaft a drift has been started in a southerly direction to over cut ore on the 220-foot level, when connection will be made between the levels for the purpose of supplying air to facilitate the extraction of ore. The northwest drift on the same level is in 140 feet in highly mineralized rock. On the 100-foot level the southwest drift is in porphyry and talc. From the 240-foot level some good ore is being raised. This is considered a valuable property.

The Thunderbolt Consolidated mine consists of the Thunderbolt and Budd. The ore-body comes to the surface, and can be easily traced for over 1,000 feet in length, which shows the strength and continuity of the vein. The vein cuts through both lime and granite dike, which is thrown up towards the northerly end of the property. There are three prospect shafts, 8, 10, and 12 feet, respectively; each shaft is on a distinct and apparently separate vein of ore, and all within a radius of about 30 feet in width. The ore-bodies have a slight dip towards each other, and the company are sinking on the middle vein with a view of cross-cutting when sufficient depth is attained, and thus find out the magnitude of the strike. The composition of the ore-bodies is somewhat similar to those of the Stonewall and Randolph mines—consisting of manganese and iron, oxides of iron, carbonates, and bromo-chlorides, and occasionally native and horn silver.

The Combination shaft is down 100 feet in a 2 foot vein of high-grade ore at the bottom which assays $131 per ton in silver. A drift is being made from the old shaft, at a depth of 80 feet, to connect with the new or Combination. In it there has been encountered some good ore. The mine is looking well, and will soon be in a producing condition.

The Old Guard has a main shaft down 350 feet. In the south drift of the 150-foot level a body of sand carbonates has been found. A winze has been sunk 25 feet from the shaft on this level, which is in a 4-foot vein of ore assaying $120 per ton. A winze is being sunk from the south drift of the 150-foot level. The north drift is being pushed forward in good ore. In a drift driven from the winze between the 150 and 230 foot levels, an 8-foot vein of good ore has been encountered. In a cross-cut on the 80-foot level a vein of 45 feet of low-grade ore was tapped. It is being systematically developed, and the prospects are that this mine will prove equal in value to any in this portion of the district.

The Tranquillity mine still keeps up its high reputation as a producer. About 30 tons of ore are hoisted daily from the whip shaft. The steam hoisting works were started up on the first of the month. Cross-cuts are being run from the 115 and 300 levels; that from the 300 expected to make connection with the whip shaft, and the one from the 115 is expected to strike the ledge about twenty feet further. The body of high-grade ore is holding out well and expanding as development progresses.

This mine is on the Contention lode and has a vein 7 feet wide. It is connected with the Contention on the 400-foot level. The main shaft is down 475 feet, and there are four levels opened at 100, 200, 300, and 400 feet. A large body of ore is in sight which is being stoped out at the rate of 40 tons per day. Its workings also connect with those of the Head Center. The ore from the mine carries free gold and horn silver. The steam hoisting works have just been completed.

In the suit between the Tranquillity and Head Center Companies, the following from the Epitaph will explain the nature of the controversy:

"Pending an appeal to the supreme court, work cannot be prosecuted on the Head Center side of the line. The Head Center folks have given notice of an appeal from the decision of Judge Stillwell. They must first file a bond of $50,000, with local security, which has not yet been done. The dispute is a novel one, and is attracting much attention from mining lawyers and mine-owners.

"Throughout the Head Center and Contention claims, the vein in dispute has been thoroughly explored. Its general course has been made apparent by these explorations. Two faults of the vein are found within the Contention claim at points, and can be seen upon the surface. The course of the vein is nearly north and south, and at depth it dips toward the west. Where the vein crosses the Tranquillity line it continues, as far as seen on its general course, maintained throughout the Head Center and Contention claims. In the suit between the Tranquillity and Head Center Companies, which was decided by Judge Stillwell, it was contended by the Head Center Company that it had the right to mine the vein on its dip from all points where its top or apex was within the Head Center ground, thus claiming the right to mine the vein across and within the side line of the Tranquillity. On the other hand, it was contended by the Tranquillity Company that, as the ledge crossed their side lines, the same became the end lines of this company, and that it had title under its patent to all that portion of the ledge included within vertical planes drawn downward through such end lines. It was also contended by the Tranquillity Company that the dividing line between the Head Center and Tranquillity was an end line for the Head Center claim, and that the Head Center Company had no right to mine the vein north of a vertical plane drawn through this line. The positions taken by the Tranquillity Company were sustained by Judge Stillwell, and the judge therefore instructed the jury that, as there was no dispute as to the course of the vein, the jury must find a verdict for the plaintiff, which it accordingly did. In the mean time, that portion of the Tranquillity inside its own lines will be regularly worked."

Since the close of this litigation the two mines have been consolidated under one arrangement.

The Girard mine has been shut down the greater portion of the year. Its mill is now working on ores from the Contention, Randolph, and some others, as a custom mill. It is also pumping the Sulphuret, and some drifts are being driven in the Tranquillity. It appears that the ore could not be raised fast enough in paying quantities, and therefore, it is said, the mine was closed temporarily. The company's claim covers 11 acres, and but a small portion of this has been worked, and it is known to have rich ore below the water-level. It is to be hoped that this well-developed mine will soon be reopened.

Mr. Huntley, the assayer of the Girard mine is engaged in a very interesting experiment. He has entered into negotiations with the Way Up Company, and is endeavoring to save the tailings of the mill run recently made at the Girard. The tailings have been caught up in an artificial dam, and from there conveyed through a series of sluice boxes and settling vats by means of water. In each of the boxes and vats are deposited some chemicals, which succeed in retaining the bullion while the dirt escapes. The experiment is pronounced successful, and is highly interesting to mining men, as considerable bullion can be saved by the operation at very little expense, either in labor, trouble, or money.

The Randolph mine has its mill at Watervale, 2 miles from Tombstone, where its rich ore is being turned into bullion. In shaft No. 1 on the 100-foot level, winze No. 1 is down 65 feet all the way in ore, with a cross-cut west, in 75 feet, in which a number of stringers were cut. Cross-cut east at this point is in 45 feet, all in good ore. At about 125 feet south from this shaft is winze No. 2, down 100 feet on the ledge, which pitches at an angle of 35°. This winze is in ore varying from 6 to 14 feet in width. At the bottom there are 18 feet of solid ore. A cross-cut has been run from this level to shaft No. 2, 180 feet distant. At 20 feet in this cross-cut a 5-foot vein was cut, upon which a shaft has been sunk in from 3 to 5 feet of good ore. At 50 feet further in this cross-cut a blind vein 6 feet thick was encountered in rich ore. Drifting on this is now going on both ways. That to the southeast is in 150 feet and the vein has widened to 9 feet, and that to the northwest is in 100 feet, the vein containing the same 6 feet. From these two drifts 20 tons of good ore are raised each day. This is on vein No. 3. At shaft No. 2, at a depth of 88 feet, a level has been started south, now in 40 feet, at which point a winze has been sunk 60 feet, all in low-grade ore in a contact ledge. The reserves now in sight are sufficient to supply 30 stamps for more than two years. The mine has every appearance of being a mountain of mineral. There are 36 miners employed in this property.

The Winfield has attained a depth of 190 feet, and 16 tons of ore milled have yielded at the rate of $250 per ton. Stoping between the 100-foot and the 130-foot levels is going on in good ore. This mine has paid its way from the very beginning. The rock is all mineralized, and the ledge is 20 inches in width.

The Spread Eagle mine has a shaft down 100 feet and a drift from the bottom, in which there is 2 feet of good ore.

The Dwarf has three shafts down, respectively 15, 20, and 60 feet, in an ore vein of 10 inches, which mills $[illegible]0 per ton in silver.

The Black Top, just south of the Stonewall, is looking very well indeed, and bids fair to rank with leading properties in that part of the district. At 115 feet a drift has been run into the hill, and, at the present distance of 20 feet, looks remarkably well. It seems to be all ledge matter, with 2 feet of mineral resembling the Stonewall ore, and is possibly the same ledge. Assays are expected to give handsome results.

In the Lima Consolidated the main incline is now down 260 feet, and a cross-cut is being made each way to tap the ore-body. The ore already milled yields $112 per ton. The indications of an extensive mineral bed are excellent.

The Longfellow is located near the Stonewall. Two drifts are started at the 75-foot level in a fine body of low-grade ore that promises to increase in value with further prosecution.

Luck Sure is sinking two shafts on a vein of 3 feet in high-grade ore that assays $300 per ton. Shaft No. 1, at a depth of 90 feet, has an ore body 4 feet between walls. In a drift from the 50-foot level in shaft No. 2 is a 2-foot vein of ore rich in horn silver. One hundred tons of ore have been milled, with very satisfactory results. This is one of the most promising mines in the district.

The Sidney mine adjoins the Grand Central on the southwest. It has a 12-foot ledge. At a depth of 200 feet they have run a level connecting with the Grand Central works, and are also drifting south on an ore-body measuring 4½ feet, which is milling $93 per ton. There is no further doubt as to its being the same lode as the Grand Central.

The Eagle has an incline down 150 feet and shows up a promising body of ore. At the bottom of the shaft on the east end of the mine, in a drift, the vein has widened to one foot, which mills $255 per ton. It is likely that this vein will widen with depth and make this a most valuable mine.

The Pedro Consolidated Mining Company consists of the Big and Little Pedro, Mattie Hickey, Accident, Idaho, and Ivanhoe.

The Epitaph, referring to developments on Military Hill, says:

"On the Big and Little Pedro there are ten outcropping veins running north, south, east, and west, all of which run into the other members of the group of mines. These ore veins have been recently prospected by shafts varying in depth from 3 to 55 feet at various points along each vein, showing that the whole length and width of these claims are average veins of ore 2½ feet wide, and with an assay value on average ore of $145 per ton. The ledge of the Green Cloud mine, which has proven a very rich one, has been prospected across the Honey Comb and the Big Pedro, showing this large ore vein contributes to the value of this group. There have been many rich specimens of ore taken out, assaying as high as $6,000 per ton, and it is confidently believed that the ore from this mine will mill upwards of $120 per ton. There is a force of men at work upon the surface, in two shifts, taking out good ore, and in sacking the ore on the various dumps, which is to be transported to the Boston mill near Charleston, the milling of which will soon determine the richness of these ledges.

"The company has been for some time engaged, night and day, on a tunnel commencing near the east end of the Big Pedro, which will in all probability be run entirely through Military Hill, on this property, and which will tap all the north and south ore-bodies, varying in thickness at this depth from 4 to 10 feet. The mine is situated about 2 miles south from the city of Tombstone, and a good road has been completed to the mouth of the tunnel."

The ore from this mine is milling upwards of $100 per ton in silver. The tunnel is now in 180 feet, and stringers of ore were encountered soon after passing 100 feet. The first ledge, the Green Cloud, has been cut 100 feet from the mouth of the tunnel. Other veins will now be tapped in the tunnel at short intervals.

In the Horseshoe the northeast cross-cut of the 225-foot level is following a seam that shows pockets of good ore. The northwest drift of the same level is in 150 feet in hard quartzite containing iron pyrites, with seams of mineralized quartz. The mine is temporarily shut down.

The Green Cloud mine is developed by a shaft 5 feet by 6 feet on an incline of 35° to the west. At a depth of 200 feet the ore vein averages 6 feet, which mills $185 per ton. There is also being driven into the hill, 400 feet below the mouth of the shaft, a tunnel which will tap the vein at a distance of 300 feet from its mouth. This is one of the most promising in the district.

The Franklin belongs to the Randolph. It has a main shaft down 100 feet, with cross-cuts east and west, on a 3-foot vein, assaying $397 per ton.

The Blue Jacket mine has 3 shafts down 85, 175, and 35 feet, respectively, all in solid ore from 18 inches to 3 feet wide. A tunnel is also being driven which has already cut three veins in a distance of 150 feet. The ore mills upwards of $100 per ton. This is destined to become a valuable property.

The Aunt Sally mine has recently opened, at a depth of 20 feet, a vein of rich ore, 3 feet wide, of carbonate and chloride contained in granular quartz. If this vein continues to develop with depth it will make of this mine a veritable bonanza.

The Black Top mine has a ledge 10 feet wide in which are two veins of 15 inches each in width, containing yellow and green chlorides of silver. This mine is well located and is judiciously developed.

The Mollie has a vein, 3 feet 8 inches wide, which dips at an angle of 30°. The east drift from the 50-foot level is in a fine body of ore which is widening.

The Marguerita has a main shaft down 75 feet in a ledge 4 feet wide containing horn silver and black manganese. The ore becomes richer with depth.

The Woronoco, or San Diego mine shows a rich vein of carbonates on the north drift of the 350-foot level, also on the north drift of 265-foot level a large body of ore between the levels. The south drifts from these levels are now being pushed.

On the Addie assessment work only is being done. This is a promising claim.

The Sulphuret has rich ore below the water-level, 515 feet. Nothing is being done on the mine except pumping water for the Girard mill.

The Prompter mine is in close proximity to the Stonewall. There are five shafts ranging from 30 to 225 feet deep, all in ore of a good grade. It is proposed to build a mill on this property.

The Omega shaft is down 55 feet in good ore which mills $169 per ton. Recently a vein 3 inches thick in this ledge was discovered that assays $4,000 per ton. This is a very promising property.

The Mountain Maid on the 70 foot level struck a small vein of rich ore; but little is being done on the mine.

Ecstasy and Shorty have a main shaft down 215 feet. It is expected to soon strike the vein matter.

The Ground Hog has a shaft down 45 feet in which is shown a vein of horn silver that assays very high.

The Eden Lass adjoins the Ground Hog and is equally rich in silver.

The Bradshaw is making a good showing in its 3-foot ledge of rich ore.

The Topsy has a 40-foot shaft in which there is an 8-inch ledge assaying $95 per ton in silver.

The Unknown mine, on Bruce street in the city of Tombstone, has a shaft down 150 feet and shows a ledge 6 feet wide.

The Sultana has four well-defined ledges running through the entire length of the claim. This property is now being developed. It adjoins the Little Devil mine.

The Gilded Age has again commenced work.

The North Point has a shaft down 100 feet. A cross-cut to the east is being run through low-grade ore. It is proposed to sink deeper until richer ore is tapped.

The Evening Star has commenced a cross-cut at a depth of 100 feet. The cross-cut is in good ore, which is 20 feet wide.

The Bulwer, located near the Fair Villa, is a promising property, on which work has recently been commenced.

The Morning Star extension and Anna claims lying east of the Grand Central are promising prospects. They are about to be developed.

The Imperial has a shaft down 85 feet, in a 2-foot ledge of high-grade ore, in well-defined walls.

The Knoxville has a double-compartment shaft down 130 feet, which upon reaching the 200-foot level will connect with the working, when development and stoping ores will be raised. Hoisting works will be at once erected.

The Bon Ton is sinking a shaft 100 feet. The ore is of a fair grade thus far.

The California mine adjoins the Cincinnati, and claims to be on the continuation of the Contention lode. Thus far no well-defined lode has been discovered.

The C. O. D. mine has a shaft down 135 feet, in a fine body of ore, which increases in value with depth.

At the Hope Consolidated, a fine ledge of ore was struck at a depth of 100 feet. It is thought that this mine will soon add one more to the bullion-producers of this camp.

The Guelph Consolidated is on the same ledge as the Randolph. The ledge shows 6 feet of good mineral, which increases in quality with depth. A shaft is down 65 feet, following the ore-body. A full force is employed in developing this property.

The West Side mine is having new steam hoisting works erected. Twenty-four tons of ore are being raised daily. This property belongs to the Contention Consolidated.

The Bunker Hill Gold and Silver Mining Company consists of the Bunker Hill, Good Samaritan, Ohio, Dragon, Cleveland, and Hazard. The development work has been confined to the Good Samaritan, which lies in the center of the group. It has a shaft down 320 feet, with north and south drifts. The ledge at the bottom of the shaft, when cross-cut, is 12 feet wide with perfect walls. The ore assays very high.

Blue Monday.—This mine has a shaft down 160 feet, and a new level has been opened 140 feet from the surface. A fine body of ore has been encountered in the south drift of the 90-foot level, similar in appearance and in value to that found in the Ingersoll.

The Head Center mine is being steadily developed, and a large quantity of ore is raised and hauled to their mill on the San Pedro River.

The bullion output of this mine will average $25,000 per month. The steam hoisting works are in place, and stoping has begun between the second and third levels. Everything in and about the mine is in first-class condition. It is proposed to remove their mill to the mine, providing satisfactory arrangements can be made with the water company.

The yield of the Head Center, from July to the present month, six months, during which it was worked, was as follows:

July	$19,346 66
August	24,618 88
September	23,430 43
October	22,720 44
November	15,216 87
December	12,000 00
Total	117,363 28

The Way Up.—Ten stamps of the Girard mill are working upon ore from this mine. The stopes on the 105-foot level are yielding high-grade ore. The level being run from the new shaft to the incline, at a depth of 175 feet, is in 250 feet. During the year the company has sunk a two-compartment shaft 175 feet deep, which is timbered from top to bottom. To all appearances this mine has a brilliant future.

The Mozambique is located several hundred feet east of the Randolph. It has a well defined ledge, 3½ feet wide, of ore resembling that of the Randolph. It is being developed by two shafts driven through ledge matter, now down 55 feet.

The Sea Surge has 3 shafts, 75, 60, and 45 feet, respectively, all in ore assaying $40 per ton. The Mamie and the Franklin lodes pass through this ground, both of which are rich. Cross-cutting is now being done.

In the San Diego the main shaft is down 425 feet. The drifts north on the 130 and 350 foot levels are making good progress. The mine is in an excellent condition.

In the Contact mine a large body of ore has been struck near the line of the Stonewall, but for some reason very little work is being done on this mine.

The cost of material and supplies in the Tombstone district is as follows:

Fire-wood, per cord, delivered	$11 00
Lumber and mining timbers, delivered, per M	42 50
Cumberland coal, per ton, delivered	42 00
Charcoal, per bushel, delivered	25
Coke, per ton, delivered	30 00
Wages of miners, per day	4 00
Wages of laborers, per day	3 to 3 50
Hauling ore to Contention, per ton	3 00
Hauling ore to Boston mill at Charleston	3 00
Express charges on bullion to San Francisco, per $1,000	16 00

Cochise district.—The mining camp of this district is at Russellville, at the extreme north end of the Dragoon Mountain. It is here that the Russell Gold and Silver Mining Company have a smelter.

The principal mine is the Peabody, which is one of five properties owned by the Russell Gold and Silver Mining Company. The formation of these locations is in limestone, of which there is a large belt extending from a mile below the mines to many miles beyond, with an average width of 2 miles. The Peabody is the most westerly of the group, and is the only one which has shown up values. The developments made in this mine consist of an incline shaft (55°), which is now down 140 feet, a winze for a further 55 feet, making a total depth of

165 feet. The shaft shows ore from the surface, and the incline is run across the ledge, which, judging from the surface croppings, is 75 feet wide. At the 50-foot level a winze is run northerly, which connects with the stopes on the 110-foot level. Two thousand tons have been extracted from this point. At the bottom of the 165-foot winze a drift has been run 155 feet in a southeasterly direction, on the ledge, which exposes a vast amount of copper ore. In places the ore is nearly a solid mass of pure metal. There is a high percentage of gold, assaying from $40 to $86 and up to $140 per ton, making the average of about $50. The average of silver is not so high, perhaps nearly $20 per ton. In addition to the above workings, a cross-cut has been run on the 165-foot level northeast 65 feet and southwest 45 feet, neither of which has struck either wall. There are 18 feet of solid ore at the bottom of the incline. The mine is producing 500 tons of ore per month, some of which is shipped for reduction, while their smelter turns out 5 tons of copper per day. The ore supply appears to be inexhaustible.

The San Antonio is one of the good properties in the district. It has a vein of 14 feet in good ore, which carries its own flux. It is now being rapidly developed.

The Cliburne mine is said to be a promising one.

The other mines of prominence, more or less developed, are the Dreadnaught, Saratoga, Wedge, Delta, Copper King, Silver Chord, Highland Mary, Republic, Southern, Concho, Donna Anna, and Boss mines. Besides these, there are scores of others owned by men who are unable to develop them. The camp is in great need of capital.

Tevis district.—The Cochise Milling and Mining Company are getting out some high-grade ore which will be shipped for reduction.

The principal mines are the Dutch Girl, Berkshire, Mary, Sunrise, General Meade, Bumble Bee, Campo, Flatonia, Hercules, Chiricahua, White Crow, Garrett, California, Cochise County, Blue Bell, New Decade, Happy Thought, R. E. Lee, &c., and carrying gold and silver, and a few of them copper.

The Copperopolis.—At a depth of 85 feet water was struck in this shaft, which is a surprise to the whole district, and forever settles the question of where the contact between the syenite and lime exists. This contact runs right through Copperopolis ground. At the bottom of the shaft is a ledge of lead-carbonate ore 7 feet wide, assays from which average $25 in silver and $4 in gold. The foot wall is syenite against which are 4 inches of red iron oxide identical with that found in the Copper Queen, in which claim it is known to contain native copper. This water-strike is as astonishing as it was unexpected, for the reason that the collar of the Copper Queen shaft is at least 50 feet lower than that of the Copperopolis, and the water-level of the Copper Queen was reached at a depth of 300 feet in their incline shaft. As further sinking is impossible without a pump, cross-cutting will be started from the 80 level and continued in a southeasterly direction towards the hill in the hope of striking the extension of the Copper Queen ore, which doubtless passes through the Copper King into this property.

The Gunsight mine is rich in ore assaying $352 in silver and 25 per cent. in copper.

Winchester district.—The Winchester mine has a shaft 60 feet deep, and drifts and cross-cuts have been driven more than 300 feet in different directions in a solid ore-body. The company is now sinking a double-compartment shaft and erecting steam hoisting works.

The Philadelphia shows a large ore-body.

The Mammoth shows a ledge 2 feet wide assaying $89 per ton.

The Disturber is raising ore that assays $68 per ton.

The Saginaw has a 2-foot vein carrying rich horn silver.

The shaft on the Grand View mine is down 65 feet, having passed through two veins of ore 5 feet thick which were pitching to the east. The bottom of the shaft is now in another ore-body.

On the Antelope good ore is being raised.

Crazy Jane, Parnell, and Ophir are good prospects.

Dos Cabazes district.—In the Juniper mine, at the bottom of the new shaft, 60 feet in depth, a vein of ore was encountered that is rich in free gold. The ledge at the bottom of the shaft is 7 feet in width, all in ore that mills $40 per ton. There is a 2-foot vein in this ledge that will mill $100 per ton in gold. A mill will soon be erected by this company. There is now sufficient ore in this camp to keep a half dozen custom mills constantly employed for years to come.

The Bear Cave mine ore is of a high grade, and is yielding a good sum as is indicated by their return.

The Silver Cave is showing some rich ore.

The Pumpkin mine is considered a valuable property.

The Traveler's Rest mine is the first location in the camp. It has a rich streak of ore in the vein which assays 32 ounces gold per ton.

Silver Camp and Ayer's Camp lie in this district.

The Mina Chiquita mine is in very rich ore.

The Goldsmith mine has at the bottom of its main shaft a ledge 2 feet wide, which assays $120 in gold and $20 in silver.

The Pepper Sister mine has a well-defined ledge of 3 feet that assays high in gold.

The Josephine mine is a promising silver lode following a narrow belt of limestone and quartzite on one side and porphyry on the other, which has been traced on the surface for a long distance. The ore is usually high in grade as shown by recent assay returns, in ounces of silver, no test for gold having been made. No. 1, $507; No. 2, $330; No. 3, $123; No. 4, $148; No. 5, $88; No. 6, $112; No. 7, $205. Several nuggets have been found which yielded 40 to 60 per cent. pure silver. There is an inclined shaft on the claim 50 feet deep, and a tunnel connecting with it drains the vein to that level. As there is a constant flow of water from the works, the cost of development will prove larger than it would otherwise be. The dumps show fine ore, and more of the same kind is in sight to be extracted.

The Mineral Park mine is said to be of marvelous richness. Its vein is 4 feet and contains a streak of 8 inches, the yield in free gold $1,000 per ton. Slugs of gold valued at four or five dollars are frequently met with.

The Carlyle has a vein of mineral from 4 to 18 feet wide, containing horn silver assaying $100 per ton.

There are many new discoveries and rich prospects in the camp awaiting the advent of capital to develop the same.

The Commonwealth mine in Wood Cañon has a 6-foot ledge at a depth of 120 feet, having an average assay of $200 per ton.

The Cincinnati and Pittsburgh Company's mill is running on First Chance ore, and all connected with the company seem to be perfectly satisfied with the result. The manager says the company intend to put up a 40-stamp mill close to the mine and save the expense of hauling ore. The mill is kept running on ore taken from a shaft that is being sunk on the First Chance. The ledge is about 7½ feet wide, and shows free gold in all ore taken from the shaft. The quality of the ore is much better in the lowest working than it was on or near the surface. The Johnson arrastra is running on ore from the Murphy mine.

Turquoise district.—The formation here is limestone with an iron cap. This is one of the most active camps in the county. The district extends westward into the Dragoons proper, but the claims that show most merit are confined to the limestone hills that connect by formation with the Dragoons southeast of Cochise Pass. The whole region is highly mineralized.

The Last Chance mine is being rapidly developed. Its ore assays over $100 per ton in silver, and is evidently a very valuable mine.

The Defiance is a mine of much promise.

The Whoop-up, General Hancock, and Queen are being developed.

The Justice has a tunnel in over 100 feet.

The Contention has a 75-foot shaft on a 12-foot vein, which assays very well.

The Tom Scott and Challenge are prospects of merit.

The Silver Cloud, on the hill of the same name, in both shaft and tunnel shows a strong ledge, increasing in grade as it enters the hill from the gulch. Due south of this the Head Center has two shafts down on the same ledge. On the east slope of this hill, and just below the Silver Cloud, the Chrysolite has a shaft down 35 feet, at which depth the water came in so fast that they were forced to abandon their work at a time when the ledge was showing its best.

The Union has five shafts down on the ledge, all showing well in mineral. The tunnel is now in 70 feet.

One of the best showings of mineral in the district, though not as high grade as some others, is the Elgin, but as its owners hold it at an enormous figure and fail to develop, it lies dormant. The first north extension of the Elgin is the Plata Verde, which, at a depth of 100 feet, shows a 15-foot ledge. Next to this to the north is the Fitzgerald, the ore from which shows a mill record at the Boston mill of $71.63 to the ton without sorting. This is found below an iron cap which is more continuous and plainly defined on the surface of the Crescent and Seek No Further, two claims lying just to the west of the Fitzgerald. Work is to be resumed on the Fitzgerald at once.

At the northern end of Turquoise Hill, Messrs. Fly & Chase are steadily developing their fine copper prospect, the Midnight, the oxide ore from which assays from 39 to 53 per cent. copper.

The Russell, Rex and the Dragoon Gold and Silver Mining Companies are mines being developed.

The Midnight mine is showing up fine. A large body of rich ore was recently encountered that promises to turn into a veritable bonanza at no distant day.

Huachuca mines.—The following from Tombstone Epitaph gives an account of a new mining locality in this county:

"There is, probably, no place in Cochise County where there are more surface indications of rich mineral than in the Huachuca Mountains. This proposition has been so often asserted and reasserted that it has come to be accepted as an aphorism; therefore needs no argument to prove the fact. The principal feature of the various districts is the enormous quantity of cupreous ores; in fact, a large majority of the lodes are more or less impregnated with copper in some form or other, principally sulphide, however. The notable exceptions to this rule are the Monarch mine and its extensions, which is a highly sulphureted gold ore, and the Iron King, Yellow Jacket, Contact. and Nellie James mines, in Miller's Cañon, which are galena and lead carbonates, carrying a high percentage of silver.

"The Iron King mine is situated on the north side of the cañon, about one-quarter of a mile below the Huachuca Water Company's reservoir high up in the mountain, and by the trail about one-half mile from the creek. This is a very large ledge upon which a good deal of work has been done. It so cuts the mountain that a tunnel can be run in upon the south end of the ledge, and for every foot and a half driven one foot in depth will be gained. A chute can be constructed from the mouth of the tunnel to an ore bin on the creek, thus delivering the ore by gravity with no further cost than the wear and tear of the chute. This will be a very large saving in cost of hauling large bodies of ore such as they have in this mine. The ore is a carbonate of lead mixed with just enough iron and manganese to be a natural and free smelting ore, the fluxing elements being apportioned as by the hand of a master metallurgist. The assays of silver range from $60 to $150 per ton, being in this respect all that could be desired.

"The Yellow Jacket is situated in a lateral cañon upon the south and is about the same distance from the creek, and almost directly opposite the Iron King. This is an unmixed lead carbonate of about $60 average contents in silver. Work is being prosecuted on this mine at the present time. They are sinking an incline shaft which is down 45 feet. At 50 feet the ore-body will be cross-cut. At 30 feet down the ore-body, where cut, was 14 feet thick. The prospects are that this, too, will prove an immense ore-producer.

"The Contact is also on the south side of the cañon, but further up than the Yellow Jacket. They are also sinking an incline on this ledge, which will be run down 50 feet, when the lode will be cross-cut. This, like the others, is a lead carbonate, of like nature of the Yellow Jacket.

"These three locations are so situate that their ores will all naturally find an outlet upon the creek at the same point, where there are all the facilities that can be desired for their reduction. Water is most abundant. The innumerable springs that break out the side of the cañon give as much water in the creek below the reservoir as finds its way from above into that receptacle, which at the present time runs to waste down the cañon. Wood in unlimited quantities abounds upon every side, with pine and fir in the near vicinity sufficient for charcoal for smelting purposes for years to come. There would appear to be no reason why this property should not, in the hands of a company of men with ample capital, make a success equal to any mines in Southeastern Arizona."

The Dunton mine has a ledge 6 feet wide, with a pay streak of 2 feet carrying virgin silver, rich in chloride and galena.

The Silver Peak mine, at the head of Hunter's Cañon, has a copper ledge very similar to the Queen at Bisbee, showing considerable native copper.

GILA COUNTY

is a compact mineral county, crossed in various directions with spurs of mountains and rolling uplands. It has some excellent grazing along the Salt and Gila Rivers. The county is immensely rich in its copper ores, also in its gold, silver, lead, iron, and coal. There are wood and water in abundance, and the climate is unsurpassed. Its only present drawback is its inaccessibility.

Globe district.—In the Mack Morris mine the main shaft is now down 800 feet, and it is intended to sink it to a depth of 1,000 feet. The ore increases both in body and richness as depth is reached. It continues to be the principal bullion-producer of the district. Its yield averages $25,000 per month.

The Old Dominion copper mine is producing 400,000 pounds of copper per month from its 30-ton smelter. The Old Globe Smelting property is now merged in this company. These ores are very rich in copper, and also contain gold and silver. Unfortunately, the presence of the precious metal with copper does not add to the present value of mines in these out-of-the-way places, as the expense of treating the ores for the separation of the precious metals far exceeds the value of the resulting bullion, and the presence of them in the copper does not add to its commercial value.

Twenty-five sacks of ore from the Old Dominion copper mine have been sent to San Francisco to be experimented on in order to determine what system of concentration will best extract the gold before the ore is smelted in the company's furnaces. The samples were taken from all parts of the following workings: The main tunnel run 400 feet on the vein, in ore its entire length; the working shaft, sunk 210 feet on the vein, all in ore; the drift on the second level run 150 feet, in ore its entire length; the drift of 50 feet from the winze, all in ore; the winze 100 feet from the main shaft, sunk from second level, all in ore, as well as the 50 feet of stoping. The ore-body on the lowest or third level is getting richer in gold, and averages 30 per cent. copper.

Captain Burbridge states that on the vein on the Keystone, one of the mines belonging to this company and upon which most of the work has been done, a tunnel has been run striking the vein obliquely and running on the vein 350 feet. In this tunnel the vein is said to widen steadily, until at the face it is entirely in ore. At a distance of about 100 feet from where the tunnel strikes the vein a shaft was brought down from the surface, the depth being 75 feet. Below the tunnel level this shaft has been sunk an additional 75 feet and a second level opened, which is or was extended 60 feet in one direction and about 100 feet in the other, connecting with a winze sunk from the tunnel line at about the point where the tunnel strikes the vein. This winze is sinking deeper. The vein widens steadily from 10 inches in the shaft to more than its full width at the bottom, the hanging wall only being disclosed there. He states that the ore ranges from 28 to 55 per cent. of copper, being red oxides and green carbonates, and that it averages from $20 to $30 in gold. He proposes to work this ore in a battery, run it over plates, and concentrate it.

The New York and Chicago mines of the same company are located 7 miles from the Old Dominion. The ledge is reported to range from 120 to 150 feet in width, the ore being found in bodies as wide as from 7 to 8 feet. The developments in the New York consist of a tunnel, mainly on the vein, 600 feet long, a shaft 105 feet deep, and a cross-cut from the tunnel to the hanging wall, where it is reported a body 8 feet wide of copper, running as high as 150 ounces in silver, was struck. On the Chicago there is a shaft 80 feet deep and a tunnel 45 feet long. Some stripping of the outcrop has been done in all the veins of the property.

The Long Island Mining Company embraces five claims, the Hoosier, Grey, Cuprite, Nevada, and Amador. Hoosier and Cuprite have been most extensively developed, and the greater part of the ore smelted will for the present be taken from these two mines. Developments on Hoosier consist of 800 feet of shafts and tunnels, over 400 feet of which are in ore. The ores are low grade, but quantity is almost unlimited.

Various estimates place amount of ore in sight on Hoosier claim at from 10,000 to 15,000 tons. Cuprite and silicate, with occasional incrustations of malachite, are the ores that occur here. The Cuprite developments consist of tunnel run in on the vein 160 feet, and winze 60 feet, both all in ore. The vein is also exposed along dip by the outcrop 120 feet, giving altogether 180 feet of exposure along vein. Course of vein is northeast and southwest. The ore constantly increases in richness as depth is attained; but no claims are made by Mr. Nicholson, general superintendent of the Long Island Company, to this being a true fissure vein. In fact, he is of the belief that no true fissure copper-bearing vein exists in the Territory. The estimated ore in sight on the Cuprite claim is between 8,000 and 12,000 tons. No doubt exists as to ore supply. There is a 100-ton ore chute on the Hoosier, and 50-ton chute on the Cuprite to facilitate unloading. These chutes are substantially built, and will last for an indefinite time. A 30-ton smelter is kept constantly at work on this mine. Weekly shipments of silver bullion are being made.

The Centennial mill and mine is making a good showing in the way of chlorination, treating the ore to 95 per cent. of the assay value.

The Buffalo mine has connected the drifts and tunnel, giving it 600 feet of one straight tunnel. There are 1,200 feet of openings, the lowest being 350 feet from the surface. The 600-foot tunnel will connect with a tramway 400 feet to the road. This way is an automatic arrangement, the loaded car going down taking the empty car back. The cars at the road end will dump their load into a bin from which the ore discharges, without manual labor, directly into wagons which carry the ore to the furnace. The furnace is treating its rich ores, which yield 20 per cent. copper.

The North Star has two parallel ledges, about 28 feet apart, each about 4 feet in width, one of the lodes being cut about 80 feet below the surface by a tunnel 125 feet in length; also having a 60-foot shaft about the center of the mine, while on the parallel lode a drift has been made on the lode of 130 feet, the ore-bodies averaging from 15 to 45 ounces.

The Fair Play has a ledge 6 feet wide, assaying very high in silver.

On the Nevada there is a tunnel 245 feet in length, cutting the ledge from the northwest 160 feet below the surface croppings, disclosing a lode 10 feet in width, the average assay of which is 25 ounces.

In the Denora the ore at the surface is 4 feet wide, and appears to be a solid body; the gangue is quartz, slightly copper-stained, and carries sulphate of silver, two average assays from the ledge returning $211.56 and $483.75 per ton.

In the Irene, from the tunnel level, the winze is down 90 feet, showing an improvement in quality of ore.

The La Plata is 40 feet below the tunnel and 120 feet below the surface. The indications are encouraging.

The Monarch mine has a well-defined vein and 18-inch gouge on hanging wall. The shaft is down 190 feet.

The Gila County mine is producing bullion.

The Vail mine is opening up good ore.

The Cat Claw is producing ore containing 60 ounces of silver.

The Topia is showing a fine body of ore in a winze running east of the main shaft 3 feet wide, carrying galena, zinc, gray copper, silver, and iron.

The Foot mine wherever tested shows gray copper of good quality.

The Arizona bids fair to become a valuable mine. A tunnel has been run 115 feet on the Arizona. It has cut 13 feet of vein-matter, which is highly mineralized.

The Stonewall Jackson is regularly turning out bullion.

The Black Hornet has a good body of ore, containing horn silver.

Work is being done on Hartford and London mines.

Mineral Creek district.—The Princeton Mining Company's property is being developed, and there is considerable rich ore on the dumps.

The South Pioneer has been producing the same rich ore as last year. On the north drift of the 100-foot level a strong body of high-grade ore was found for a distance of 50 feet, where an almost solid mass of mineral 3 feet wide was encountered. The vein matter is full of free silver, and in places there is fine wire silver. The steam pump easily controls the water. The ore now being taken out of this mine is a pure black sulphuret, and is remarkably rich. A mill is under process of erection.

The Howard mine is erecting hoisting works over the main shaft.

GRAHAM COUNTY.

The mineral resources of this county are in an undeveloped condition. The principal industries are agriculture and grazing. Its many mountains and hills are known to contain gold, silver, lead, copper, iron, and coal in great abundance. During the past, roving bands of Indians have prevented the income of miners and capital; but now, there being no longer any danger from this cause, emigration and capital are flowing in, and within a very short period the county will in all likelihood make a good showing as a metal and fuel producer.

Araivaipa district is situated in the Pinalon Mountains. The principal mine here is the North Star, which has a remarkably strong quartz vein, the croppings being 60 feet wide and rising 150 feet from the bottom of a ravine which crosses the vein to the crest of the slope. The vein shows with remarkable boldness along the whole hill, in the ravine, and in the hill beyond the ravine. It lies between granite and a formation composed of shales and limestone. It stands nearly perpendicular, and is a contact vein, occupying a situation that is in all respects favorable for carrying ore. The character of the ore is a gray and yellow carbonate containing silver and galena and sufficient iron to insure the ores being amply fluxed. The value of silver is $35 per ton, and of lead 10 per cent. This mine is within 10 miles of the Deer Creek coal fields, and near plenty of wood and water.

Bunker Hill district is situated 58 miles north of Benson and 8 miles east of the San Pedro River, on the northern end of the Salurio Mountain. The mass of the mountain in the vicinity of the prospects and mines consists of syenite, quartzite, porphyry, and diorite, with some slate. The whole rock series is highly metamorphic and in places eruptive, and is much tilted, folded, and contorted. The principal locations are the Silver Hub, Rob Roy, Bunker Hill, Virginia, Kentucky Giant, and the Plymouth. These claims are more or less developed, but not sufficiently to show the extent of the ore-bodies and to warrant their being called mines.

On the Silver Hub a shaft has been sunk 56 feet in depth, passing through 2½ feet of solid oxide and sulphuret of copper carrying oxide of iron, assaying from 50 to 85 per cent. of copper and from $40 to $100 per ton in silver.

The Rob Roy shows a fissure vein containing green and blue copper carbonates with galena and lead carbonates.

The Bunker Hill has a large quartzite mass some 50 feet in height and

150 feet in width on the cap of the hill, stained with copper carbonates, which, it is thought, will make it a valuable copper mine containing some silver.

The Virginia shows throughout its length copper ores of carbonates and oxide of high percentage.

The Kentucky Giant shows kidneys of green copper oxide and of metallic copper and a whitish, decomposed mass charged with copper carbonates and sprinkled with metallic copper.

Lone Star district is 10 miles from Safford, the county seat of Graham, and about the same distance north of the Gila River. The original discovery of these mines was made by J. P. Lindsey and others in the summer of 1879, but, owing to Indian troubles in the near vicinity, they have not been worked to any extent. While there are many copper ledges in the district, the majority of them are distinctively gold and silver. The mineral belt is about 5 miles square, within the boundaries of which over 100 locations have been made.

The mine upon which the most work has been done is the Lone Star. This has been sunk upon to a depth of 45 feet, and has a vein of solid sulphide ore 2½ feet thick, the assays from which run over 40 per cent.

The most remarkable one, however, is called Horseshoe, from the configuration of the outcroppings to that article. It is 480 feet around the shoe and 50 feet across the ends thereof. The croppings are continuous and 4 feet thick. A pit has been sunk 4 feet deep on the ledge, from which not less than 3 tons of ore were taken that give an average assay of 48 per cent. copper. The country rock inside this cropping is an iron-stained porphyry that looks as though it might give way to a mass of ore beneath.

On the Alvarette mine a shaft has been sunk on the property 25 feet, showing a vein of solid copper ore in the bottom, over 2 feet in width, which will average between 40 and 50 per cent. in copper, while select specimens will run as high as 80 per cent. The ore is a gray copper and a black-and-red oxide.

On the Lone Star, another location near the Alvarette, there is a shaft 40 feet and a ledge of ore in the bottom that runs from 30 to 40 per cent.

The district is about 7 miles from Safford, the county seat of Graham County, about the same distance from the Gila River, and about 40 miles from Bowie Station, on the Southern Pacific Railroad. About 10 men are now at work in the camp, and the ledges are steadily improving in size and richness as depth is reached.

The Clifton hydraulic mine, near Clifton, has expended over $400,000 in fitting up and equipping the property. The works are not yet complete, but its production for the year is said to be $10,000 in gold, which was produced in a very few days.

A Scotch company has purchased the well-known Longfellow and other copper mines at Clifton, and the productive capacity is being largely increased. A large body of copper ore has been discovered 150 feet from the mouth of the tunnel in the Sunset mine. The lode has been penetrated to a depth of 80 feet, and develops solid ore all the way.

MARICOPA COUNTY

is situated in the southwestern portion of the Territory. It is the principal agricultural county. It is also rich in its mineral deposits, which are being gradually developed in a quiet way.

Up to within a short time very little was known of this portion of

Arizona. The discovery of the Gunsight mine has made this a promising section for both prospector and investor.

The production of precious metal in that portion of the county lying south of the Southern Pacific Railroad is in its infancy, but enough is known to make it rank in the near future with that of Cochise County.

The survey of the Tucson and Gulf of California Railroad is now being made. This road is to open a new port, Point Lobos, for the reception of freights, which will be of great advantage to this county when completed.

Myers district is the principal one and the only one from which it has been possible to secure information of much importance.

Gunsight mine is the leading, most developed, and best equipped mine in the district. Its enterprising managers, Messrs. Bivins & Caldwell, are about to start the 10-stamp mill which has been in the course of erection during the past year. Recent developments in one of the veins are regarded as the most valuable yet made. This mine it is thought can furnish sufficient ore to supply a 100-stamp mill for many years. It carries the greatest abundance of ores fully rich enough to yield a handsome return from the milling. The company is sinking a three-compartment shaft, one of said compartments being designed for a pump of a capacity sufficient to supply all needed water for the proposed 40-stamp mill to be erected under the dump. It is expected that such a supply will be reached within 500 feet. The shaft is now to be sunk as rapidly as men and the best machinery can do it. The future of this district, if not this entire region, depends very materially upon the result of this undertaking. It is perfectly reasonable to expect that the desired amount of water will be found within the given limit. If so, this region will prosper for a time at least, let the final outcome be what it may. The shaft is probably the finest in Arizona, so far as size, strength, and perfection of timbering and hoisting appliances can make it so. It is to be the working shaft for a number of large ledges other than the Gunsight, belonging to the company; hence its pumping and two working compartments. The mine is only prospected on the ledge, which a careful examination leads one to think is not the principal one. All the ledges with the exception of the Gunsight pitch to the east, and when opened up the Silver Girt will undoubtedly be the principal vein of the mine. The prospecting work on the mine consists chiefly of an incline shaft 200 feet in depth and a tunnel cutting the ledge at 100 feet, a drift 200 feet on the vein at the 100-foot level and a cross cut at the 200-foot level. The shaft is all in ore, the drift is all in ore, and the cross-cut at the bottom of the shaft is through a body of ore 42 feet wide. There is no wall where the ore ends at the east end of the cross cut, and the appearance of the ledge in the tunnel 100 feet above indicates that another body of ore belonging to the Gunsight ledge will be found corresponding to a 12-foot stringer in the tunnel above. At the west end of the cross-cut, after leaving this large ore-body, the pitch of the formation changes to conform to the pitch of the Silver Girt, towards which it is running and which it is expected to reach in about 30 feet. The intervening rock is not all barren, but is interspersed with stringers of ore. Of the size of this ore-body there can be no question.

The mine has two characters of ore, free-milling and smelting, the former predominating. The milling ore consists of black sulphurets and chlorides, and the smelting ore is lead and iron carrying silver. It also carries quite an amount of gold in places. There is considerable ore assaying up into the hundreds and thousands of dollars, but the wealth of the mine and what is destined to make it a great bullion-producer and dividend payer is its great body of low grade ore. The lowest assay, taken by a competent disinterested party along the roof of the 42-foot cross-cut in the 200-foot level, yielded $29. As the richest ore in the mine becomes dust under the blows of the pick, a sample taken in that manner must have been against the mine. The nearly 4,000 tons of ore taken out during the work of prospecting will average between $30 and $40 per ton.

If the present plan of opening up the mine and locating the mill so that it will be below the hoisting works is carried out, there should be no difficulty in mining and working this ore for from $10 to $12 per ton.

The following is copied from the Arizona Citizen, regarding the Gunsight group of mines:

"Opinions and belief in the great worth of the famous Gunsight group have, in the recent visit of Judge G. W. Baker and Prof. P. D. Barnhardt, received additional and positive proof. Both gentlemen, after a most thorough and practical examination, pronounce the mines to be even better than was at first supposed. Before coming here they had been given to understand that the mines were good, but they were in no wise prepared to find them, as they did, much better than represented. Professor Barnhardt is a scientific man, close-calculating, cool-headed, and logical, and, together with Judge Baker, would be the last man to overrate the productiveness of the mines in question. Their visit to the mines was made in the interest of the stockholders, who, before making further outlay, which, for machinery, &c., must necessarily be large, desired an impartial examination made, and for that purpose chose the two gentlemen named. They, with Colonel Bivins, were at the mines for over a week, and took cognizance of every visible part. On their return here, their report was made and forwarded and had the effect of placing unlimited means in the hands of the company for the putting of the mines on a first-class bullion-producing basis. They report the formation to be of a most superior character and consider the future success of the mines assured. The Baker shaft, now down about 260 feet, has exposed and opened up enough ore to run a 40-stamp mill for an indefinite number of years, and it is but fair to suppose that the mine will hold good its character for a much greater depth. Colonel Bivins, at a low estimate, placed an average value on the ore of about $35 per ton, but the result of the investigation has, by numerous assays, raised it to double that amount.

"The rock from which the assays were made was, by the professor himself, taken from different portions of the mine, the two extremes in the quality of ore being avoided, and in case either one was taken a like amount of the other was also pulped with it, thus at all times giving it a fair average in value. It was demonstrated that the ore in the 200-foot level (north drift of the Baker shaft) would average $60 to the ton. On the 100-foot level of the old incline shaft the average is, in close figures, worth $43.36 per ton. On the 200-foot level of the same shaft, where the ore-breast has a face of at least 40 feet, the average assay value across was found to be $81.70; and a sample of ore taken from the dump of the old works gave $74.95. The ore was found to contain a little gold, and but a small percentage in lead. By the almost entire absence of the latter metal its free milling properties are known."

The Burro-Burro copper mine is thought to be one of the most valuable mines in the Territory. The ore, so far as tested, gives an average assay of $108 per ton in value. It also contains some $40 per ton in gold. Of this mine Professor Williams says:

"There are about 5,700 feet length of good copper-bearing fissure veins on the property; that two of them have been placed in condition to be made available for the production of ore with but little more work, when proper machinery shall be put up; that the yield of the ground now exhibited in the Burro-Burro vein is undoubtedly sufficiently high to be remunerative, and that the east vein is fully as rich, if not more productive; and, finally, that there are good reasons for expecting concentrations of the ore in depth. These are palpable reasons, in my judgment, why the Burro-Burro property cannot fail to be profitably worked, by continuance of the same judicious and intelligent practical management heretofore displayed.

"It may be added that with the favorable conditions of mining and transportation obtaining on Lake Superior, an average yield from the whole ground broken, of eight-tenths of one per cent. is sufficient to cover all expenses, including mining, reduction, and office expenses of the companies, when copper sells at 17 cents in the market. A most liberal allowance for the increased expenses of mining, &c., in Arizona would still leave a wide margin for profit for the handling of ground yielding seven and a half times as much metal; that is to say, 6 per cent. of metallic copper, which is now the average yield of the ground exhibited on the Burro-Burro property, as shown by the assays given above of samples taken by myself. It may be here remarked that the average ground broken in the Calumet and Hecla mine, yields from 5 to 8 per cent. in metallic copper.

"There should be a careful consideration given to the question of metallurgical treatment of the ore, as soon as sufficient ground is opened to make available a supply sufficient for the furnaces to be erected. As the ore shows at present, the only plan to make it marketable appears to me to be by running into black copper, by means of the water-jacket, or equivalent form of blast furnace. The cost of this form of treatment, in Arizona, is about $20 per ton of ore treated, according to the data I have been able to collect, or about 4 cents per pound of copper in an ore yielding 25 per cent. in the furnace. There remain, therefore, 13 cents per pound to cover all other expenses of mining (about 4 tons of ore-bearing ground to produce 1 ton of 25 per cent. ore), sorting, and transportation to market of the black copper. If, however, the sulphides come in stronger in depth, as I believe they will, a system of reverberatory treatment into matte would recommend itself as much cheaper in cost of plant and operation, and as giving a product which would be marketable for the gold and silver as well as for the copper."

This mine is situated on the southern slope of the mountain, one mile from the Gunsight mine; the ledges measure from 30 to 40 feet in width. Machinery has been contracted for, and smelters will be in operation early in 1883. It has lately been incorporated in Philadelphia under the name of "Silver King Gold and Silver Mining Company."

The Red Buck is an extension of the Silver Girt mine, and situated in the apex of the hill. Eight men are employed in its development.

The General Hancock is located on a 2-foot ledge that assays well in gold. A shaft has been sunk 25 feet, exposing a well-defined foot wall.

The Montezuma is opened by a shaft along the incline of the ledge upwards of 50 feet in depth. The vein is 10 feet in width between fine smooth walls. There is a second ledge, but its size and value have not yet been determined. The lode of the Silver Girt is said to pass through this claim, which enhances its value.

The McClellan is worked under the same management. It is also developed by a 50-foot shaft sunk along the vein, and is in good ore throughout. Some 50 tons are already on the dump which will assay $60 to the ton.

The Morning Star Extension is another valuable property in this district which has been secured by a Philadelphia corporation. It is prospected by a shaft 100 feet deep and a cross-cut 20 feet wide without reaching walls. It is a second extension on the Gunsight ledge, and, like it, will undoubtedly show better at lower depths. The company has had a survey preparatory to securing a patent, and will also let a contract for further development.

The Esmeralda mine shows a well defined 4-foot ledge in good ore.

The Atlanta lies between the Silver Girt and the Westward, and is a strong, well-defined lode. It is opened at three places through the croppings, and is highly mineralized. The character of its ore is the same as that of the Gunsight, and it will undoubtedly make a valuable property.

The Westward is a most promising prospect, having a ledge 12 feet wide and well-defined walls. The vein matter is strongly mineralized. The shaft is down 20 feet. A party of Eastern gentlemen have bonded this property, and will sink a shaft to a depth of 100 feet and cross-cut the veins. All the present indications point to this property developing into a big mine. The ledge is traceable for the whole length of the claim. The character of the ore is similar to that in the Gunsight.

The Mineral Bed mine has a double-compartment incline shaft down 160 feet. At 100 feet a cross-cut was run from the foot wall 25 feet without reaching the hanging wall. The surface ore was valueless, having a burnt, lifeless appearance, and carrying metal only in spots. At 160 feet the vein had pitched out of the shaft until the foot wall of the vein had become the hanging wall of the shaft. At this point the foot wall fell into the shaft, revealing a body of rich ore carrying black sulphurets, chlorides. and native silver. The finding of this body of ore at that depth in such a wide ledge makes the future of this mine assured. The shaft is to be continued to a depth of 200 feet and then across the vein.

The Mineral Bed North Extension is proving to be a very promising claim. It is located immediately north of the Mineral Bed mine, over the mountain, and as the mines on the north side appear much superior to those on the south side, great hopes are indulged in of its being a bonanza. The croppings are fully 12 feet wide, extending the entire length of the claim. A shaft has been sunk at the narrowest point on the ledge, 25 feet deep, where the vein is about four feet wide and is growing wider, with clean walls. The ore from the bottom of the shaft assays $740 per ton.

The Holstein has every indication of being a rich and permanent ledge. On this claim there has been a shaft sunk 35 feet.

There are a great number of claims, the majority of which are not yet opened. Those which have made an effort at development are called Sam Purdy, San Domingo, Starlight, and Happy Jack. All show a vein of rich sulphuret ore, which will make the camp one of the richest in Arizona.

A valuable silver ledge has been discovered south of *Myers district.* The formation consists of sulphurets of silver, mixed with native silver, all leading to a common ledge.

Vulture.—The Central Arizona Mining Company, formerly the Vulture, still continues to be the most productive mine in the county. Its average monthly output is about $25,000 in gold bullion. One of the evils that have beset the mining business of the Territory has been the unwillingness of miners to work on anything but rich ore, which was found only here and there, while there are immense quantities of low grade, which with proper management can be worked with profit, as evidenced in the case of the above mine, which has worked very rich ore in the past, and no doubt has more of it to work, but for a long time has been running with profit on ore that was formerly discarded, and did not pay to work, probably owing to a want of proper management. At any rate it pays to work it now.

Magazine district.—The Red Rover mine is being systematically developed. It has produced a large sum already from ore shipped for reduction.

The other leading mines are the Phœnix, Silver Nugget, and Montcalm, all showing good ore and being rapidly developed. The ores contain silver, gold, and copper. Another very rich ledge has been discovered near the Red Rover mine, Phœnix, by a miner named Magruder. The ore contains flour gold in considerable quantities.

Very rich rock has been struck in the Copper Queen mine, 16 miles west of Wickenberg. At the bottom of their 65-foot shaft the ledge has widened out to a fine body of ore, assaying 80 per cent. copper. The mine was bonded some time since to a San Francisco company, through its agent, Mr. Metchke, with the condition that should the mine be found to be a true vein at a certain depth the sum of $90,000 would be paid for it. Two shafts have been sunk. One has reached the depth of 40 and the other 65 feet, and in both the character of the ore is the same. A larger force of men will be put on, and the work of taking out ore for reduction will soon begin. In the immediate vicinity of this mine several others are being worked with satisfactory indications.

The Maggie May is in Magazine district, on a ledge that may be traced for miles. This is the only development among many locations. It is a true contact vein and must be inexhaustible. The first assay showed $4, then it immediately ran up to $10, then higher. At the present time, at the depth of 140 feet, there is a ledge of 65 feet assaying $70 per ton.

Cave Creek district.—The Carbonate Chief South has made no production during the year, although the mine has been somewhat prospected.

Cave Creek mine is showing up well in rich ore containing gold, silver, and copper.

A new district, called the *Copper Mining district*, has been organized. It embraces the mountains south of Phœnix.

MOHAVE COUNTY

lies in the northwestern portion of the Territory. It is 208 miles long by 88 miles wide, having nearly a dozen large fertile grass-covered valleys, which are divided by ranges of mountains filled with all kinds of precious metals. Owing to its isolation from centers of population, its inhabitants are mostly engaged in prospecting and mining. The Atlantic and Pacific Railroad will shortly be completed through its center, when the mining and grazing industries will become more rapidly developed. The county is rich in gold, silver, lead, copper and antimony. There are 2,700 mining claims recorded in this county, which number will be augmented fully 2,000 within one year of the advent of a railroad.

Wallapai district has but one 5-stamp mill to work custom ores.

The Alpha mine has a 3-foot ledge on which a shaft has been sunk 85 feet in ore that averages 100 ounces silver. It is chlorides and black sulphurets, carrying copper and lead.

The ledges in the vicinity of Stockton which show the most development and which will average from 5 to 15 feet in width, are the Sixty-three, Mocking Bird, Cupel and Tiger, Infallible, Star-Spangled Banner, Pioneer, Miner's Hope, Tigress, Cincinnati. The ore in any of these will average 80 ounces in silver.

The Mocking Bird is at present worked on lease. There is a shaft 140 feet deep. There are two or three other small shafts and a few short levels and one level run on the ledge over 150 feet in length. At this point the ledge is about 3 feet in width. The pay streak is small but rich; 5 tons of the ore assorted milled at $550 per ton.

The Sixty-three is a famous ledge. It has produced more money than any other mine in the county. Its ore has been milled at Miner's Park, showing results of $1,200 per ton from select ore.

The Tigress is a well-defined vein, and has produced several thousand dollars from ore shipped. There are now 75 tons of ore on the dump, which will average 200 ounces of silver per ton. Four average assays, recently taken from four different parts of the mine, went as follows:

	Silver.
No. 1, 50 feet from surface	$365 87
No. 2, 85 feet from surface	151 00
No. 3, 105 feet from surface, bottom shaft	677 00
No. 4, open cut	691 70

Wherever the mine has been opened it looks first rate.

The Infallible, owned by McKenzie, Hate & Co., old miners and prospectors, has several tons of ore on the dump, which will work 100 ounces in silver per ton.

On the Cupel mine recent work has developed rich ore at a new point. This mine has been a great producer, over $150,000 having actually been taken out by what is termed chloriding, that is, getting out the ore in the cheapest manner possible. The high cost of shipping ore and the high price of milling in times past have forced the miner to make the most of the present without regard to the future working of the mine, and hence the mines do not present the appearance that they would if carefully opened up with a view to exposing the ore, instead of taking it out wherever found. If the Cupel mine had been simply opened up by shafts and drifts and its rich ore left on the dump, it would be difficult to find a more promising mine. But while the mode in which it has been worked makes it look badly at the surface, yet it has nevertheless proved its value, and the very rich ore that is in sight at its deepest working (115 feet) augurs well for its future when properly worked.

The Keystone mine is being rapidly developed by its enterprising owners, and its mill is making them independent.

The Fairfield is also a fine property. It is prospected by a shaft nearly 200 feet, and tunnel 1,450 feet, from which flows a large stream of water sufficient for a 10 or 20 stamp mill.

The Lone Star mine has yielded ore of the value of $200,000, and is still, as it were, unprospected. It has a 9-foot ledge, carrying ore worth from $100 to $2,000 per ton.

The Star-Spangled Banner is a gold ledge, and a good one. Considerable work has been done on it, and there is ore on the dump.

The Pioneer is a very large, strong vein, owned by Kenedy & Potts. The ore is low grade—$60 to $80 per ton—but they have any quantity of it. When this grade of ore can be worked in the district a new era will dawn upon it.

The Miner's Hope is a 14-foot ledge with a 3-foot pay streak, which averages 100 ounces silver per ton. It has a shaft down 75 feet.

The Cincinnati has a large vein of high-grade ore, carrying lead and antimonial silver.

The Snow Flake is a large lode, assaying $150 per ton silver, and 30 per cent. lead.

The Warner is the west extension of the Snow Flake, and is showing good and similar ore.

The Silver Monster has only had assessment work done.

At Todd Basin Milligan Brothers reside and work their mine called the "Silver." They have a pay streak in the mine 18 inches wide, paying from $75 to $400 per ton.

The Todd mine is owned principally by Hon. A. E. Davis; is a large and valuable property. This mine is from 20 to 60 feet wide, and the ore runs from $20 to $2,000 per ton.

The Atlantic and Pacific Railroad is fast nearing this wonderfully rich mining section, and it is safe to predict a large immigration into Mohave for the purpose of following mining pursuits. The best-developed mine in the section is the American Flag, in Wallapai Mountain. It is developed by tunnels and drifts 3,000 feet in length, and by a shaft 305 feet deep. It is owned by the Richards Brothers and other gentlemen. They have worked hard all the while for six years developing this property.

At Cerbat John Barry and partners own a 16-foot vein, named in honor of the town. The company have a fine mill, and good results have been produced in working ore from their claim.

The Florietta, owned by Mrs. Charles Gross, is a very rich mine, from which a great many thousand dollars have been extracted by arrastra process.

The Iron Side, owned by Milligan Bros., is also a large mine with much high-grade ore.

Other mines around Cerbat are equally promising. Here mine owners have struggled along for eighteen years, waiting for a railroad to bring them supplies and machinery, with which facilities proper work can be executed and money made.

Gold Basin district, 30 miles north from Chloride, is destined to become the gold-producing section of Northern Arizona.

The El Dorado is a mammoth property in its rich and regular vein. It has 26,000 tons of ore visible and of great richness.

Chloride, situated north of Mineral Park, is surrounded by hundreds of chloride deposits, many of which have yielded large sums.

Just west of the town is a natural hill 3,000 feet in length, through which runs a vein of $30 chloride ore. In former years it was called by Andrew Judson, Ira Woodruff, Messrs. Benjamin and Judson, the owners, Silver Hill.

Santo Domingo district.—The Oriole Company is pushing work night and day on the Excelsior and Hilo Verde. A large force of men are employed, and the ore on the dumps accumulates rapidly. The main shaft of the Excelsior carries four strata from 6 to 14 inches in width, containing black metal, chloride, horn silver, and argentiferous galena. These strata are gradually converging to a point of concentration, and at their confluence a large deposit of rich ore is anticipated. The west drift in this mine is also in ore of an exceedingly rich character. None of the ore is being hoisted to the surface, and the foreman is very reticent regarding information concerning the richness of this bonanza.

The Prosperity is situated in Todd Basin, 4 miles from Mineral Park. The owners have put out some splendid ore and have 140 sacks on the dump, which assays from $600 to $800 per ton.

Mineral Park district.—The Wood Chopper mine, owned by Mr. J. W. Haas, is a promising and productive mine. The developments are a tunnel 120 feet to connect with a shaft 75 feet deep on a 5-foot true fissure vein. The ore has milled over $100 per ton.

The Nellie is a new discovery which is said to be very promising.

Maynard district.—The Mariposa has one shaft 40 feet deep and another 60 feet deep on the ledge. The ore is chloride, containing from 20 to 30 per cent. gold. The pay streak measures from 6 inches to 2 feet wide, and will average $65 to the ton. From this mine 10 tons of high-grade ore have been milled at the Mineral Park mill, $600 to the ton, and there are about 20 tons of low-grade ore on the dump which will go about $100 to the ton. The first-class ore from this mine, which milled $600 in silver, contained about $150 in gold.

PIMA COUNTY.

Pima County is the oldest mining region in the United States, and is the richest county in material wealth in the Territory. Its industries are agriculture, grazing, and mining. It has untold wealth in its partially developed mines, many of which will likely become as valuable, both in silver and copper, as any ever opened in the Territory. Their development has been marked by a steady progress partaking of the character of legitimate industry which will gradually and surely reveal their wonderful resources.

Tucson is soon to have a custom smelter, which will greatly aid the outlying mines in having their ores tested, treated, and converted into bullion.

Empire district is perhaps destined to become one of the richest in the Territory within the next two years.

The Total Wreck mine has proved itself to be one fabulously rich. There are over 50,000 tons of ore in sight, showing a value of nearly $4,000,000. At the present writing its 20-stamp mill is about ready to turn the ore into bullion. The mine is now opened to a depth of 325 feet by an incline shaft following the dip of the ledge, which is about 35° to the south. The main shaft is well and thoroughly timbered. It is a double compartment, the larger of which is supplied with a tramway for the ore cars, which are used instead of a cage, the incline being so slight. The other compartment provides a stairway for descent into the mine at once easy and safe. The foot wall is the floor of this incline, and only so much of the ore was removed from the ledge as was necessary to make and timber the incline, and although the vein is cut from 8 to 10 feet in width, a large body of rich ore still remains on the hanging wall, which in one place has been cross-cut 16 feet, and in another place 21 feet. Stations will be placed at every 50 feet on the incline shaft; at present they are 100 feet apart, and from each station drifts have been run on the ledge to determine the extent of the ore-body and to prepare for extracting it. The first, or 105-foot level, has 230 feet of drifts, more than one-half of which is in ore; 212-foot level has 250 feet of drifts, all in ore; the 325-foot level, the drift was run from a winze southeast of the shaft, and has not yet reached the shaft. It is 90 feet in length, and is yet 20 feet from the shaft. A tunnel has been run into the hill, cutting the shaft at the 212-foot level, and has a length of 249 feet. Winzes have been sunk between the levels, which show immense bodies of ore.

At the mouth of the main shaft on the apex of the hill are located the hoisting works but recently completed. The building is a substantial structure 24 by 75 feet in size. Double reels are driven by double engines of thirty horse-power aggregate capacity. The machinery is all of the best manufacture and most approved patterns. The ore car, after reaching the mouth of the incline, will run on a tramway a short distance to a covered ore chute and be emptied. The ore will descend a distance of 70 feet to the ore house in close proximity to the mill.

A good supply of water is obtained from a well 1½ miles south of the mine, at a depth of 180 feet, which is forced by means of a steam pump into tanks of the capacity of 100,000 gallons, erected upon the apex of a hill, from which it flows to the mill, whence it will be pumped up to the hoisting works. Mains have also been laid in the town of Total Wreck, and its people will be supplied from this source.

The Forty-Nine is a property which may prove equally rich with the Total Wreck. It has been opened to the depth of 120 feet, all in ore, and a cross-cut of 90 feet shows the ledge to be 20 feet in width. Drifts have been run on the 90-foot level, and a fine body of free milling ore exposed. The ledge has been traced the whole length of the claim upon the surface, and is found on several extensions. The character of ore is chloride and carbonate, containing but little copper. The quantity of ore will warrant the immediate erection of a mill.

The Red Cloud mine, about 3,000 feet northwest of the Total Wreck, is one of the favorite prospects of the district, having same formation and same ore on the surface as the other two mines now being developed, and at the depth of 30 feet fine carbonates and chlorides have been struck assaying $83 per ton. A shaft of 100 feet is being put down on this mine, and from present indications the most favorable results may be expected.

The Cross mine has been considerably developed, having a shaft of 100 feet and another of 75 feet, and a cross-cut showing the ledge to be 20 feet wide in ore assaying $100 per ton.

The Justice and Mammoth group of mines are looking well and show rich ore upon the dumps.

The Michigan Boy is a prospect of great promise. It appears to be a contact between quartzite and lime, and a shaft has been sunk 50 feet showing good ore. It lies in the near vicinity of the Forty-Nine.

The Bullion is another property which has been demonstrated by development work to be a valuable mine. It is situated in the vicinity of the Forty-Nine and Michigan Boy, and will doubtless become a bullion-producer as soon as it passes into the hands of the company now being organized to take it.

The Border Ruffian is being steadily worked and is making a good showing.

The Rough and Ready, Hancock, Jefferson, London, Columbia, and Mackey are promising mines opened within the year.

Arivaca district.—The Papago Chief and Sanders Mining Company are being developed.

The Consolidated Arizona Mining Company is the principal producer of bullion in this camp.

The Longarino mine is not being worked.

There has been some work done during the year on the Albatross, Arkansas, and Oro Fino, with encouraging results. The developments on the Albatross are a shaft 125 feet, showing a vein from 12 to 14 feet between walls, carrying both gold and silver. A tunnel is being driven into the hill to tap the shaft. There are 1,000 tons of ore on the dumps, which will work $80 per ton, as shown by milling results made for a test.

Harshaw district shows symptoms of reviving. The Jeffords smelter is running out large quantities of bullion daily, and the Harshaw mill is again in operation.

The Hermosa Mining Company, which is very productive, has a 20-stamp mill, and several thousand tons of ore on the dump.

The Hardshell group and other neighboring mines of the Hermosa are awaiting the power of capital to open up their limitless deposits of rich chlorides.

The French mine has made no production, and is now idle.

Washington district.—The W. C. Davis mine is producing bullion by means of a smelter, yielding $125 per ton in silver.

The Rich Strike mine contains ore carrying 40 per cent. lead and 30 ounces silver.

The Flux mine is reported as being rich in ore.

The Mowry mine is still lying idle.

The Columbia copper mine and the Omega copper mine are erecting smelters.

The San Antonio shows in its workings a fine body of rich ore in a 15-foot ledge.

The Holland Mining and Smelting Company's mine has been closed during the year, owing to bad management of its owners.

The Belmont is an old mine, having been worked eighteen or nineteen years ago. They have a perpendicular shaft down 110 feet, and an incline of 70 feet. The ledge is 60 feet wide, dips west, and averages about $23 to $25 per ton, with a varying percentage of lead. One feature in this mine is the absence of mundic, the ore being, as a rule, a lead carbonate and free milling, pretty uniformly diffused.

Silver Bell district.—The Scout mine is said to be making a fine showing of a large body of high-grade red oxides and carbonates of copper.

The Hermosa shaft is now down 40 feet, all in ore. Two feet of the ore is black oxide, assaying 67.90 per cent., and the remaining three feet of the shaft is in carbonate ore, assaying 48.50 per cent.

The Cochise mine is also giving great promise. The shaft on this claim is down 25 feet. Two feet of the ore is rubicite, assaying 57 per cent. copper, and four feet of carbonate ore, assaying 40 per cent. The ledge is fully 15 feet wide. What the balance of the ledge assays is not known.

This is a very promising copper camp.

Tyndall district.—Nearly 200 new mines have been located in this district during the year, and the greatest activity prevails.

Rich developments have been recently made on the Laura mine, owned by the Surprise Silver Mining Company. It is said to be one of the richest mines in Southeastern Arizona. At a depth of 30 feet the rich ore is about 3 feet wide, and carries chlorides, platinum, horn silver, and native silver. Assays of selected ore run from $500 to $2,500 per ton. Works are now being erected for the reduction of the ores.

Michigan Boy is a prospect of great promise, the surface indications comparing favorably with the best mines in the district. It appears to be a contact between quartzite and lime, and a prospect shaft sunk upon a broken-up portion of the ledge shows some very good grade ore. This mine has just been bonded, and a contract has been let to sink 50 feet.

The Pantano Mining Company owns a group of seven mines at what is known as the "basin." Upon these mines considerable development has been made with satisfactory results. The Side Wheel has two shafts down about 50 feet each, and it is expected that cross-cutting will develop a body of high-grade ore. A recent purchase of the company, the Jefferson, located in the basin, is showing some of the richest ore in the district. The ledge is traceable for a long distance, and a number of prospect holes have been sunk, showing high-grade ore. The company has made a contract for running a tunnel 50 feet on the ledge, and in one day ore was taken out sufficient to pay the contract price.

The Red Oak and Sonoita Mining Company owns fourteen claims. But little work has been done thus far on this property, but sufficient to demonstrate that the Puterbaugh, Augusta, Ben & Don, Paula, and Newton are good silver-bearing lodes.

These claims are very advantageously situated, being only 10 miles from the Sonoita station on the New Mexico and Arizona Railroad, and within easy distance of the mills along the San Pedro and the smelter at Benson. Those who have visited the camp and examined the property have no doubt of the existence of a large body of ore underlying these claims, and even if it is low grade the property is so situated as to be easily worked.

Of this district the Arizona Citizen says:

"After the checkered vicissitudes of 300 years of life and death, the Salero mines, famous in chronicle and tale, are about to be reopened, and the wealth that once freighted the caracals of grasping Spain or flowed to the capacious coffers of the Church, whose fathers taught the benighted savage the mercies of crucifixion that he more contentedly might slave and toil and satisfy their greed for gold, will ere long be made to swell the rivulet to the brook, and open its unnumbered millions, long hidden in the secret crypts, to the mighty sesame of the miner's searching pick. Its caves, no longer guarded by the baleful fires of Arizona's retarding curse, will gleam under the flash of the electric light and be worked in peace.

"A group of twenty-seven mines, among them some of the most famous, lying in parallel and intersecting ledges, have passed to the hands of a company composed of some of the most wealthy, influential, and enterprising men of the city of New York, who will without delay begin work upon a scale befitting the envied reputation of the old Salero and Tumacacora treasure troves, spoken of in legend and chronicle as without a world's parallel, and for whose acquisition men died and their bones whitened in the sun. Nowhere on the earth's surface can such a grouping of mineral wealth be found. Close and compact, as by special design, the lodes, clear, defined, and regular, gird the isolated hill which rises from the valley for a thousand feet, belted and seamed with ore, near which stands the old Mission, desolate, ruined, and dead, a landmark for years past, whose floor and walls have been worked and dug in the vain hope of unearthing secret stores. Of the twenty-seven mines in question, thirteen of the number have had enough work done to meet the requirements of the law for the granting of patents, in addition to the work done at different intervals during the past 300 years. Many of their old names have been forgotten, so that by more modern appellations they are now best known. First on the line of parallels is the old Tumacacora, now known as the Lost Mine, and about whose identity speculation has long been rife. The legends of its marvelous wealth whetted the appetite of many a man to his death, but it certainly is soon to be, by a cleaning out of its old nooks, revealed, and the contents of the book for generations sealed will be known to all.

"The Eureka, on the same ledge, once worked under a different name, has on surface measurement an ore-body of 35 feet in thickness, and along which, with an intervening space of 10 feet, two tunnels have been run for a distance of about 310 feet, and the five separate shafts sunk at intervals along its course vary from 20 to 50 feet in depth, and the whole body averages an assay between $40 and $1,300 per ton. On the same lead is another location known as the Last Resort, its shaft of 10 feet showing up the same quality of ore as the one last named. Beginning on the second parallel comes the Wide West with its aggregation of 34 feet of shafts with various tunnels and cuts in and across the 5-foot vein, whose lowest average value is said to be not less than $200 per ton, particular portions of it being valued at four times that sum. Most of the work is new, and there are about 50 tons of choice ore on the dumps. The Helen and the Romeo follow as named. The latter at one time has been extensively worked, as its half-filled shafts, tunnels, and cuts abundantly prove. The ledge is remarkable for its immense width of 40 feet, and some of its ores, almost beyond belief, are worth about $22,000 to the ton, but the general run is from $60 to $18,000. And now the old Salero, with its 300-foot shaft, its cavernous mouth of nearly 50 feet in diameter, and its immense ore-dumps, bespeaks the activity and the labor done some three hundred years agone. The old shaft, now full to within about 80 feet of the surface, has defied the best energies of many a determined man for its reopening. Wrightson and others, though failing, left behind them the work of their toil, and their graves mark the resting place of their ambition. The last ore taken from the mine is recorded to have yielded fully $700 per ton, and the second class or refuse ores now stacked upon the dumps are said to average $200 as they lie. The Salero King, a ledge of the same nature, joins it on the right and forms the intervening claim between the old Salero and the Lucifer, the latter a mine from which, because of its compact body of 5 feet of chlorides, much is expected. It was formerly worked by Wrightson, who was apparently obliged to desist because of the flow of water which now fills the different shafts.

"On the fourth parallel ledge are located the J. Sylvie, Happy Thought, and the Hoo Doo claims. A 5-foot vein of great merits, as the ore on general average is estimated to be worth about $163 to the ton. On the fifth parallel are the Emma, Lucky, and Pinafore. The assessment work is done on all. The ledge is about 4 feet, well defined, and assays about $40 to the ton. The Red Cloud, Miner's Mine, Hardscrabble, Quick Return, Moffat, Slip, Outlaw, Sergeant, and Pearl are all good claims that will well pay for development. The Red Cloud and Miner's Mine have been the most worked. The former has a shaft of 68 feet and the latter one of 45 feet deep. The ledge shows the same in both, being about 5 feet in width, carrying chloride and native silver all through, worth about $1,500 per ton. The actual width of the vein is not known, as the hanging wall has not been reached. The Pearl is an immense ledge of low-grade quartz, probably 100 feet in width, but is more than doubly valuable because of an unfailing spring of good water which breaks pure and clear from among the quartz, and of a volume large enough for the use of a 20 stamp mill, which the company propose to erect in addition to a system of electric lights for the lighting of the different works. A tunnel 5,232 feet long will be run to cut through the principal ledges, commencing at the Wide West ledge, which it will strike about 550 feet below the apex of the hill, and ending with the

Red Cloud mine. The tunnel will be 12 feet wide and 8 feet high, with a double track, and the cars will be worked by means of an endless cable. A $500,000 working capital furnishes the means with which the intentions of the company are to be carried out."

Cababi district.—The Pichaco mine, abandoned years ago by its Mexican owners, leaving about 4,000 tons of ore on the dumps for lack of water, is about to be reopened and made to become a bullion-producer.

Pima district.—The San Xavier mine has been sold to the Santa Rita Land and Mining Company, with a view to its development.

The Càlabasas and Santa Rita Land and Mining Company are pushing their work at Sahuarito Station. A well has been sunk and an abundance of water found at the depth of about 38 feet. Men are now at work making adobes, preparatory to the erection of the necessary buildings, the roofs of which will be of tin. The engine, boiler, and blower are already on the ground, and the other machinery will follow in as soon as it is possible to get it there. The company are satisfied that an abundance of ore will be furnished to be custom worked, outside of the product of their own mines at San Xavier, of which there are ten, mostly copper-bearing.

The Democrat and Queen, two parallel veins of good copper, are said to be quite large and exceedingly valuable properties. Their surface croppings are so wide that present developments fail to define the true size of the veins, but enough is known to warrant extensive reduction works being put up for their own especial use.

Oro Blanco district.—The Blue Wing mine is being rapidly developed. The main shaft is down 115 feet, when the ore-body opened to 8 feet in width, and assayed $120 per ton in silver. This is the lowest level from which ore has yet been obtained in this district. Bodies of ore have been found on the surface of the mine to a width of 150 feet. Numerous excavations have been made at such places and large quantities of ore have been extracted. The company has already had 100 tons of ore milled, which netted $60 per ton. Hoisting works are now being erected, and in a short time all the necessary machinery for working at low levels will be on the ground.

The Yellow Jacket mine has lain idle during the year.

The Golden Star is said to have opened a body of ore which is milling $90 per ton in silver.

The Silver Wing Mining and Milling Company has had a mill test made of its ore, which gave an average battery sample of $216 per ton. The ore is very free and can be worked to 90 per cent. It is expected the coming season to place this mine upon a dividend-paying basis.

The Warsaw mine is looking well.

Wrightson district, though comparatively unknown, is destined to become one of the rich bullion-producers of the Territory. Many of her ledges are large and well defined, and are favorably situated, with an ample supply of wood and water.

The Atchison and Topeka Railroad opens communication with this district, an advantage possessed by few.

A group of mines that will ere long make themselves famous and form a nucleus for a great camp that will give employment to thousands of busy hands, is that known as the Bragg and Mansfield group, situated on Temporal Gulch, on the western slope of the Santa Rita Mountains.

The group consists of eight separate claims, viz, the Surprise, Mansfield, Bragg, Oriental, Pacific, Star, and Lillian, of which the Bragg and Mansfield are the most prominent because of their development.

which, on the latter mine, has been carried to the depth of 50 feet. On the others little else than the assessment work for the present year has been done. But wherever an excavation has been made, either by cut, shaft, or drift, the fact has been demonstrated that underneath lie vast bodies of valuable ore.

On the Mansfield, which is the central mine of the group, the greatest amount of work has been done, it being the belief of the owners that one good developed mine was of more practical value than a dozen whose wealth was indicated only by surface croppings. Consequently when they had money to spend they used it in deepening the shaft on the mine named. On the surface the vein measured but 2½ feet; at the bottom of the 50-foot shaft it has widened between walls to 15 feet of solid mineral, with the hanging wall still throwing away from the almost perpendicular foot. From top to bottom the assay of the ores has yielded the same results with wonderful regularity. When 50 feet down three average assays, each one cutting across 5 feet, gave a return of $23.93. The greatest variation among the different assays made amounted to but $1.63. By some the ore is called rebellious, inasmuch as it contains iron, while the percentage of gold is but light.

On the Surprise claim the assessment work only has been done, the depth of the deepest shaft being but 9 feet, with a cross-cut to either wall, which exposed 11 feet of the same quality of ore as that encountered on the Bragg, adjoining, which opened out in its shaft of 10 feet with equal strength. They, together with the Mansfield and Oriental mines, are abutting claims on the same ledge.

The Star mine is an extension of the Rupert, owned by Messrs. Lyon & Hughes. The vein is smaller than the ones mentioned, but equally as compact and of a much higher grade.

On the Rupert there are several development shafts, one of which is 80 feet deep, and from which ore has been taken that milled in the neighborhood of $300 to the ton. On the Rupert, as on the Star and Pacific (the latter an extension of the Star on the Rupert lead), the vein matter is several feet in thickness, mineralized throughout, but the rich or pay streak varies in thickness from 12 to 28 inches.

The Pacific is simply opened by a 10-foot cut, showing the character of the ore and the width of the vein.

Another, known as the Lillian, lies on a ledge running parallel with the Mansfield, and is now being worked. It has a large body of fine-looking quartz, probably 5 feet in width, carrying silver and gold in paying quantities.

The mines spoken of are situated on the west side of Temporal Gulch, while the Charlie and Oriental lie over and against the eastern bank. The Oriental is, in fact, but an eastern extension of the Bragg and the Charlie, and eastern extension of the Lillian. On the Oriental a shaft is now being sunk that promises fair to uncover a body of ore equal to that in the Mansfield, Bragg, or Surprise mines.

Helvetia district is situated 25 miles southeast of Tucson, in the Santa Rita Mountains.

The Bulldoser mine, located on the west side of the Santa Ritas, is erecting a smelter. Recent developments in the Bulldoser have opened an abundant flow of water for working purposes, and also a richer ore-body than ever before encountered in that mine, samples of which yield 60 per cent. copper. It is gratifying to all the miners in that vicinity to note these substantial evidences of permanency and prosperity, and they look for a camp of some considerable importance to spring up near the works of the Columbia Copper Company.

The Columbia Copper Mining Company purchased property in May, 1882, and having sufficient ore reserves in sight at once arranged to erect a 30-ton water-jacket smelter; the smelter was completed in August and a trial run was made, producing 10 tons of black copper. On September 29, smelter started permanently, and with the exception of a stoppage of eight days for coke, has run continuously to date, and is still running. Average daily product is 3½ tons black copper, of about 95 per cent. fine.

The Omega mine, at the 50-foot level, has a vein 24 feet wide of 20 per cent. copper. A smelter is now being erected.

The Warwick, Sweet Bye and Bye, and Grey Copper claims, on the same ledge, have veins indicating large ore-bodies containing $10 in silver and 30 per cent. in copper.

Silver Hill district is situated 35 miles west of Tucson. The principal mine is the Abbie Waterman. The east wall of the ledge is quartzite and the west wall lime. The width of the vein on the surface is from 20 to 40 feet. The ledge is iron-capped and can be traced 3,500 or 4,000 feet. It can be distinctly seen the entire length of the Abbie Waterman claim. The ore is carbonate in character, carrying about 40 per cent. in galena, and varying in silver from $20 to $100 per ton. Upon this mine there are about 150 feet of tunneling near the center of the claim. Near the north end is a shaft about 40 feet deep, and also other smaller openings. In all the workings good ore has been found, and in considerable quantities. In the shaft about 12 feet of ledge is shown. The facilties for working this mine are excellent, and its situation is a very advantageous one. The Abbie Waterman is surrounded by at least a dozen locations, all showing mineral.

The Southern Extension of this mine shows a good body of ore.

The Monarch has a shaft 60 feet deep in good ore. It is very seldom that such bold croppings are to be seen. This mine could be worked by a tunnel to great advantage, as it is situated upon a steep mountain-side, where the ledge can be easily cut at the depth of several hundred feet.

There is a claim called the Richmond, about 800 feet west of the southeast end of the Abbie Waterman, upon which some work has been done, showing good ore.

PINAL COUNTY

is distinctly a mineral county, as its surface is covered with sandy wastes, hills, and rugged mountains. Its ore-bodies are noted for their size and richness. Its country rock is mostly granite and porphyry. Rich coal deposits exist in the eastern portion of the county. A railroad is projected from Pinal City, to Casa Grande, which, if completed, will rapidly develop the mining industry. Its permanent mines, the Silver King, Mount View, Jessie Benton, Pinal Consolidated, &c., are steadily producing bullion and metal, and an inflow of capital is daily felt in the sale of mines and equipment of mining properties. The ores are gold, silver, lead, and copper in immense supplies.

Empire district.—The Silver King is one of the richest mines in the Territory, and for years has been a steady producer, paying regular monthly dividends to its stockholders. It pours out its constant stream of silver into the current of business. Two thousand people thrive around the mine and mill in growing wealth from the production of this true bonanza, which yields nearly $1,500,000 each year. To show the internal structure of this mine the following description is given by the editor of the Pinal Drill:

"There is a double-compartment shaft, which passes the 110-foot level, the 250-foot level, the 356, 408, 510, 612, and lands on 714 below, which they have sunk 35 feet, the entire depth of the shaft being 749 feet. On each of these levels, from 250 and down, are stations and iron tracks, running through drifts towards the large ore-chamber or timbered excavation that reaches from the 510 level to the 356, and 9 feet above, extending in size 95 feet by 60, up to 40 by 20.

"On the 714 level, starting from the shaft, they run a track 106 feet north, 70° west, through a large chamber 70 feet wide, of which 45 feet is on the west side and 25 on the east side of the track, commencing 14 feet from the station. The timber used in this chamber is 16 by 16 feet and 12 by 12 feet. In all this chamber there is metal in spar, quartz, and porphyry, apparently endless. There is a drift from this station about 60 feet, starting southeasterly, but turning within a few feet to the northeast, the general direction being to the northeast; but in this drift, which seems to be abandoned, no traces of mineral are found, nothing but country rock. There is no water on this level, nor, indeed, through the whole mine, to inconvenience the work. The dip of the ore is 20° east of north. The shaft is perpendicular all the way down. It starts about 200 feet west of the old discovery shaft, and at this depth 106 feet from the base of the incline of the ore to the shaft, so that the angle would be about 80° towards the east of north. This is the only level on which any effort has been made to explore on the southerly side of the center line. Below this level for 35 feet the shaft is in the lode and in metal.

"There is a winze from the 714-foot level up to the 612-foot level, which runs through ore and is used as an air-shaft. There is a drift of 92 feet from the shaft to the northwest, all in rich ore, quartz, spar, and porphyry.

"The 510-foot level.—The drift starts from the station in the direction of 10° east of south, then turns, at 20 feet, to north-northeast. It is about 50 feet long before it reaches the large excavation, 40 by 20 feet, and 9 feet high, not timbered. This is all in quartz, spar, and porphyry, full of rich metal. The old works are about east of this chamber. There is a winze from the 612 to this level, all through ore.

"The 408-foot level.—The direction of the drift is the same as below, that is, east of south for about 20 feet, and then turns northeast to the large chamber, which is here 95 by 60 feet and 50 feet stope, in porphyry, quartz, and spar. The dip is the same direction, east of north. The winze connects with the 510, all in ore.

"The 356-foot level.—The winze connects with the 408. Here the dip is clearly indicated, 75° to east of north. The talc wall and porphyry vein dip distinctly from the old works above. The direction of the drift is the same as below, that is, to the north-northeast from the shaft, where it reaches the large chamber or stope, which is here 50 feet high, 75 by 80 feet in extent. The winze, stope, and 35 feet of the drift are all in rich ore, quartz, spar, and porphyry. The distance from the shaft to the chamber here is about 100 feet.

"The 300-foot level.—The same direction of drift from shaft, viz, north-northeast, 235 feet in length, with a cross cut at about 200 feet to the west-northwest, 70 feet in spar, carrying rich metal. At this cross-cut is a large stope, 20 feet timbered. Here is the same dip. The mineral commences about 35 feet from the shaft, eastward, of the same character as below.

"The 250-foot level.—There is a drift 240 feet to the north-northeast, the same as below, with a cross-cut at 200 feet, running 50 feet to the west-northwest and 15 feet to the east-southeast. At the end of the drift are two short cross-cuts. Same character of ore throughout as below.

"The 110-foot level.—There is a drift of 240 feet through ore to the east, a little north, towards the old works, on the surface. It reaches within 10 feet of the big basin, and would have been opened into that basin were it not for fear of flooding the mine with water that might suddenly accumulate in the great basin of the old works, in a cloud-burst, which is not infrequent.

"The ore-body appears to be stretched in a direction a little west of north to a little east of south, and the ore deposit to be on the north of a middle line drawn through the main shaft on the surface. The ventilation in the mine is perfect.

"The surface-work is an oval excavation about 85 feet across and nearly 200 feet deep. The ore in the original discovery mound, which is close by this excavation, is very apparent on the surface. With this immense ore-body and the extraordinary facilities for working, they could just as well run 150 stamps at Pinal as 20."

Why they do not work a thousand tons of ore a day instead of 60 is a mystery to the public. The coal fields are close at hand, with abundance of water, and a climate which does not impede work of any kind for a single day in the year. Prof. C. H. Aaron, the new superintendent of the Silver King, a man of great experience in the handling and testing of rebellious metal, has published the following, which will be of value to those having mines in which the ores are of a similar character:

"When the Kiss lixiviation process was first introduced at the Silver King works the ore was of a character to render that process eminently applicable, being of a rather high grade in point of richness, and consisting largely of fahlore, chlorides, bromides, and oxides, in a gangue of quartz and heavy spar. Zinc blende and galena were not present in any considerable quantity, if at all.

"The roasting furnace used was that known as the 'Pacific chloridizing furnace,' a simple rotating cylinder of boiler-iron lined with bricks, 16 feet in length by some 6 feet in diameter, and capable of containing a charge of about 5 tons of ore. Such a furnace is usually provided with but one fire-place, the flames from which pass over the ore within, the smoke and flames escaping by a flue at the opposite end. Unlike the Brückner furnace, which it otherwise resembles, this has no arrangement for moving the ore from the cooler to the hotter end, and *vice versa*, and in a cylinder of such length a considerable difference of temperature is unavoidable.

"To obviate this difficulty and enable the ore to be sufficiently heated throughout and yet not too highly heated in any part, my predecessor introduced an improvement consisting in placing a fire-box at each end of the cylinder and firing each alternately at intervals of an hour, either fire-box being connected with the flue at pleasure by the raising of a damper.

"This arrangement has the unquestionable advantage of a more equal heating of the ore. It has the disadvantage of wasting a great deal of fuel; also, a portion of the ore is lost by being deposited in the fire-boxes, through which the dust, impelled by the draft, must pass on its way to the flue. The dust so deposited among the glowing embers of the recently abandoned fire forms clinkers and causes rapid deterioration of the grates. Other minor defects of the system may be passed over.

"It was found that the ore sustained a serious loss of silver by volatilization during the roasting, to prevent which steam was introduced, as was done by Von Patera, who first made practical application of the solubility of silver chloride in the solutions of the alkaline or alkalino-earthy hyposulphites in 1858 at Joachimsthal, from a suggestion made by Dr. Percy ten years previously. The effect of steam is to decompose the volatile metal chlorides, by which the volatilization of silver is mainly determined, converting them into oxides with simultaneous formation of hydrochloric acid. The latter then assists in the decomposition of remaining sulphurets, and the formation of silver chloride, which of itself is not very volatile, and, though capable of decomposition by steam at an elevated temperature, is not easily decomposed in this way, especially in the presence of salt, chlorine, and hydrochloric acid constantly tending to its production. At this period the character of the ore was such that a charge of 5 tons could be well roasted in from fourteen to sixteen hours, converting about 95 per cent. of the contained silver into chloride.

"The results were so satisfactory, despite the prediction of wiseacres, who are 'not dead yet,' that two more furnaces of the same kind were erected, and a respectable monthly output of bullion was attained.

"Unfortunately, as depth was reached in the mine the character of the ore changed. The proportion of chloride and fahlore diminished, and zincblende and galena became more and more abundant. The roasting became slow and tedious. The percentage of soluble silver in the roasted ore decreased somewhat, causing richer tailings, and as the richness of ore also decreased, a serious diminution of the monthly output of bullion was inevitable. The ore also developed a tendency to cling to the lining of the furnace, forming a thick crust on the bricks, necessitating frequent stoppages for the purpose of its removal, and, in the interim, greatly reducing the capacity of the furnaces.

"In the month of April of the current year the length of time required for the roasting of an average charge of 3½ tons reached a maximum of 32 hours, a figure above 29 appearing on the record for the first time in that month (with the exception of a single instance in March, when the charge is reported as 'spoiled in the furnace').

"When the writer took charge of the works in the month of May, the roasting was continued in the same manner, by the same workmen, and with results similar to those of March and April. The ore, however, was of somewhat lower grade. In June the average time required to roast a charge increased, and in July the ore became so bad that the men who had been roasting for two years found it impossible to avoid 'balling.'

"The balls formed were peculiar, being perfectly spherical, resembling shot, and of all sizes, from that of a pin's head to that of a marble, extremely hard, and consisting of concentric layers. When a charge is 'pilled' in this manner it requires from fifty to seventy hours to 'sweeten,' and as these pills refuse to soften in the leaching, the extraction of a high percentage of the silver becomes impossible, unless the ore be recrushed; moreover, the roasting under these conditions is necessarily imperfect.

"Determined to ascertain if it were possible to roast such ore in such furnaces in the ordinary manner, with the addition of 10 per cent. of salt, the writer in person made the attempt, and succeeded in turning out a charge containing but very few balls; and chloridized to 90 per cent. But the care and skill required to effect such a result were too much for the workmen, who continued balling the ore.

"I will here call attention to a circumstance which operates very disadvantageously in these works. The ore for the roasting is crushed wet and received in pits dug in the ground. It is thus impossible to prevent the separation of the finer and lighter portions from the coarser and heavier, and although in removing the ore from the pit and drying it in a reverberatory furnace an effort is made to obtain an equal mixture, it unavoidably happens that some of the roasting charges contain much more than a due proportion of the heavy mineral. Thus not only does the ore, as it comes from the mine from day to day, exhibit considerable variations in quality, but these variations are much aggravated by the system of wet crushing and the lack of proper facilities for repulverizing, storing, and mixing.

"Each furnace charge is sifted *by hand work* into an elevator, and the lumps formed in the drying are then pulverized in a Dodge machine and also elevated. The entire arrangement of this department of the works is faulty in conception and wasteful of ore and labor in operation.

"In the month of July, when the ore was not by any means at its worst, analysis showed it to contain 12 per cent. of zinc (equal to about 18 per cent. of blende), 6 per cent. of lead as galena, a good deal of antimony, a little arsenic, and very little iron or copper. It also carries trifling quantities of cadmium, selenium, tellurium, and bismuth. The conjunction of antimonial and plumbiferous minerals with zincblende tends to make the roasting difficult.

"The character of the gangue exercises a great influence on the roasting. The presence of quartz is advantageous; spar or gypsum is not troublesome, but earthy carbonates are detrimental. Magnesia is bad. In July the ore contained less quartz and spar than formerly, and more of the so-called porphyry, which contains magnesia in abundance.

"In the case of ore which balls in the furnace when roasted with salt, the usual practice is to roast without salt to a certain stage, when the salt is added and the heat increased; but the presence of metallic silver and the absence of a fair proportion of iron rendered this method inapplicable. The next idea which suggests itself to the metallurgist is to roast to complete oxidation without salt, and then chloridize by an addition of calcined copperas and salt. This method, with a slight modification, has been used on some of the worst of the ore with very good results.

"Another plan which has been used with success is to mix a certain proportion of sand with the ore. A charge of 3 tons of ore with the addition of 7 per cent. of sand is roasted better and in a shorter time than the same quantity of ore without sand. The sand used contains a little silver, being the coarser portion of a pile of rather rich tailings from former concentrations. It is not always necessary to resort to these expedients, for, as already said, the ore varies, and some pits admit of roasting in the same way as formerly. The addition of one-third of clean quartzose silver ore was found to act very favorably, 95 per cent. of chloride being got in twenty-four hours with 3-ton charges, but such ore is not readily procurable.

"The monthly output of bullion for the present year, as assayed at the works, has thus far been:

January	$58,198 62
February	52,486 11
March	27,780 10
April	48,023 01
May	34,695 14
June	38,690 86
July	23,795 65
August	30,017 17

"One reason of the falling off in the bullion product is that whereas formerly one-half of the concentrations went to the roasters, thereby increasing the value of the ore roasted and leached, now all the concentrations produced are sent away and sold, as I do not find it necessary to use them for the roasting, and it is more profitable to ship and sell them. The record of shipments of concentrations prior to May is not at my hand, but an idea of the difference in this branch of product may be gathered from the fact that the production for August and September has been, allowing for a lot now drying, $89,918. Had one-half of them been leached as formerly, the bullion product would have been largely increased."

The following is from the Denver Tribune:

"Speaking of the Silver King display at the recent exposition will be of interest. The Silver King comes bearing crowns and tangible wreaths of pure wire and native silver. Silver in every conceivable shape, fantastic and original, but pure virgin silver as struck from the depths of the mine by the miner's pick and the volcanic action of giant powder.

"This mine is a peculiar one, and bears the name of Silver King in a manner most appropriate, and can be classed as one of the wonders of the age.

"The mine has been worked for several years, and the ores were of such value even from the croppings, that previous to the times of railroad communication in Arizona they were carted by teams hundreds of miles to the nearest connection by steamer for San Francisco. Previous to its incorporation the King levied no assessment; since its incorporation it likewise has levied no assessment. It has paid its way from the day that the adventurous prospectors stuck pick into its malleable silver, glistening in the sunshine, within a few feet of where General Stoneman's command camped days and days. The King bears credit of being the foremost property in Arizona; it has paid over a million in dividends, it has asked no aid from its stockholders. The different levels are timbered with the best material, transported by rail over a thousand miles to Casa Grande, the nearest railroad station. Its shipments of bullion and concentrations have been continuous and constant, and the thunders of a 20-stamp mill daily and nightly make music in transforming the product of this Arizona wonder from crude, into bullion susceptible of coinage. Its depth at present is 714 feet. Many of its levels, particularly the 714 and 600, are virgin soil glittering in non-exaggerated wealth reaching beyond the numerical thousands and climbing into the catalogue of millions. The mill and mine give employment and have for years to over a hundred men. The management say that on the erection of the new mill now contemplated four hundred men may be placed to work."

This mine is phenomenal. Nature was more generous with silver than with the quartz to carry it. The quartz streak which largely carries native silver and black sulphurets is only 10 feet wide. The balance of the mineral is in vein porphyry.

The South Silver King hoisting works have been completed. It has a shaft down 200 feet in ore, containing antimonial silver. It is a mine of much promise.

The Silver Queen mine has stopped work.

The Alta.—There has not been much work done in this vein, but it is clearly exposed in an open cut or tunnel, a short distance from the prominent outcropping. There is a considerable quantity of this ore in sight.

Work has been commenced upon the Washington, where the ore dip points below the Silver King. The vein is only 8 inches, but very rich.

The walls are granite and solid with talc gangue. The incline shaft is down 75 feet in average ore of $100 per ton.

The Josephine.—Work is being resumed on this promising ledge.

Arrangements are reported as having been made with an Eastern company, with ample capital, to work on the belt of mines lying to the northeast of the Silver King, and lively times may shortly be anticipated in that direction. It comprises the Black Diamond, Manhattan, Santa Rosa, Quaker City, Indiana, and one-half of the Rattler mines. Considerable development work has already been done on these mines, which show a well-defined ledge.

The property of the Terra Rica Mining Company consists of eight mining locations, viz, the Ohio, Wisconsin, Grandfather, Maria Jane, Amador, Norway, and Scotland, all situated in Pioneer mining district, from 1 to 2 miles northerly and westerly of the Silver King mine. They are on distinct and prominent ledges, viz, the Grandfather ledge, the Redeemer ledge, the Amador ledge, the Fernandez ledge. The Grandfather and Maria Jane are on the Grandfather ledge. The Ohio and Wisconsin are on the Fernandez ledge. The Amador, Norway, and Scotland are on the Redeemer and Amador ledges (parallel ledges). There are a number of other ledges passing through various parts of the different claims. The work done is as follows: On the Grandfather a joint shaft of 50 feet; on the Maria Jane, a tunnel of 60 feet to strike the Grandfather ledge at a depth of 400 feet; on the Ohio, a tunnel of 20 feet; on the Amador, 50 feet; on the Wisconsin, an open shaft cut on the ledge; on the Norway and Scotland, a tunnel of 25 feet, one shaft 40 feet, one shaft 15 feet, one shaft of 10 feet, and a lot of prospects and discovery shafts and open cuts in various places. The locations are all well situated for work. There is plenty of living water and wood for working purposes. Good roads and trails lead directly to every shaft and tunnel. There are mineral and mineral veins in every one of the locations, and assays show excellent grade of mineral, which in its character is galena, chloride and oxides of lead, brittle silver, large copper indications, silver and gold in quartz. On the Ohio there is a cross-ledge very prominent and promising.

The Mount View mine is being actively developed. They have now 4 feet of first-class ore at the bottom of shaft, sufficient to keep a 10-stamp mill busy. It will average $300. The mill turned out 193 pounds of bullion as the result of five days' run; value, $3,000.

The Pike mine has 200 feet of tunneling, with a winze of 50 feet. There is a good body of ore-bearing rock in the winze, and quite a quantity of good ore on the dump. There is porphyry and spar; the ore carries galena, some copper stained; there is a prospect of a very large mine.

The Anna Belle is a well-defined ledge, traceable for a great distance. It is on the same ledge as the Southern Cross. On the mine is a shaft 50 feet deep, and a 4½-foot wide vein between good walls. The country rock is porphyry and slate. There is plenty of water and wood, and a good wagon-road can be made to Gila River. The assays average $20.50 in gold, and run from $4.50 to $20 in silver.

Windsor Consolidated mine has a 5-stamp mill working upon its ore, which is antimonial silver.

The Southern Cross mine is situated 9 miles south of Pinal. The ledge runs southeast and northwest across a gulch, and up the side of a mountain with a dip of about 45° to the north. The Beatrice ledge runs east and west and dips slightly to the north. The shaft is sunk on the Beatrice ledge about 15 feet east of its intersection with the Southern Cross. It is now about 40 feet deep, and the extra dip of the latter ledge should bring the two together in a few feet more. Where they are now working, the vein is about four feet in width with a good foot wall, the hanging wall not having yet been found. The country formation is talcose slate, an excellent formation for gold. The ore is very rich, carrying gold, silver, and copper, principally gold. For a considerable depth assays of the rock averaged $200 in gold, but the vein for the whole depth will average $30 in gold, and $20 to $50 in silver. There are about 20 tons of fine ore on the dump, 8 tons of first-class ore which will average $200, and 12 tons of second-class which will go $40. Half a dozen specimens picked from the dump show free gold in considerable quantities. The country rock close to the ledge assays from $6 to $7. The location of the mine is favorable. There is plenty of wood in the neighborhood, water for mill purposes within a mile, and it is only two miles by an easy down grade to the Mineral Hill road, to which point a wagon-road could be constructed at an expense of $500. Altogether, the Southern Cross is a very promising claim, and the owners are to be congratulated on their good fortune. They intend to suspend work on the mine for a time during the hot weather.

The Bunker Hill is about one mile from Box Cañon. There is a tunnel of 100 feet which starts in on the ledge but leaves it. It could easily be reached again by a short drift. The ledge is 3 feet in width and carries gold and silver.

The Westfall is about half a mile from the Bunker Hill. It is owned by the Westfall Brothers and Townsend. The ore is red and gray oxide of copper, carrying gold; ledge 8 feet in width. Assays give 39 per cent. copper and $32 gold. The ledge is cut by a gulch which shows it up well. There is a tunnel 40 feet deep to tap the ledge.

The Eureka has a shaft 30 feet deep to a level 60 feet in length, then a winze below the 30-foot shaft 55 feet deep to another level 60 feet in length. Another winze connects the two levels at their termination. From the lower level there is another winze 45 feet deep. These winzes and levels are all ore. At the bottom of the 45-foot winze, which is over 130 feet below the surface, the pay streak is 4 feet wide. Some of the ore is very rich.

In the Martinez mine the drift in the bottom of the new shaft is 30 feet where they struck rich ore. The pay streak is as wide as the drifts and they have not yet cut through it. They are still going on with the drift and will cross-cut when 50 feet is reached. The ore is smelting ore, rich in silver, running up to $200 per ton. There is a large quantity on the dumps in sight.

The Continental group of mines consists of the America, Australia, Africa, Asia, Europe, Bio-Bio, and Renaico mines. They are all on the great Continental ledge, which is probably the largest and most prominent mineral ledge in Arizona, traceable a length of 12 miles over the country, and terminating at what is now generally known as Mineral Hill. The mines we have mentioned are owned in one body. The ledge crops out along the entire surface of these locations prominently, and is very wide in places—from 30 to 100 feet. There are a number of parallel mineral veins running through this ledge, amongst which two are very prominent, one of black spar and one of quartz. Each one of these locations has been partially developed. Shafts as deep as 30 feet have been sunk between solid walls, and considerable quantities of ore are on the dumps. The assays of ore from seven different shafts of these mines averaged about 40 per cent. lead and $9, $28, $229, $22, $7, $17, and $50 in silver.

Pinal Consolidated Mining Company own the Silver Bell and Columbia. The mines of the company lie at the head of Martinez Cañon, about 6 miles north of Gila River and 16 miles east of Florence. Altitude is 3,550 feet. and general formation of the country in immediate vicinity is porphyry and quartzite. The Columbia tunnel starts on south side of hill, about 250 feet below summit, and runs due north and parallel with ledge 600 feet through porphyry all the way. Five hundred feet from face of this tunnel a drift has been run west 56 feet to ledge. At breast of Columbia tunnel an ore chute extends 100 feet and connects with Belle tunnel, which enters the hill on north side 150 feet below summit and runs south 290 feet. All ore from upper workings comes down through chute and is let into cars through a door which is closed when cars are full. The drift runs through vein porphyry and shows some mineral. West end of drift is in ledge, and from this point a drift has been driven north along foot wall of ledge 170 feet, showing chlorides, carbonates, and galena all the way.

In a cross cut extending to hanging wall is a fine body of mineral carrying chlorides and carbonates, assaying way up in the thousands. At this point vein is 24 feet wide. Hanging wall is porphyry and foot wall partially quartzite. Both show a remarkable smoothness. Thirty feet south of this cross-cut another one has been made and extends toward hanging wall 24 feet, but has not reached wall yet. It shows fine ore all the way. Opposite first cross-cut an upraise of 70 feet has been made on foot wall and shows ore all the way. Fourteen feet farther south an upraise of 40 feet has been made on same wall and shows ore of good grade. North and south drifts here noted form a continuous tunnel nearly 300 feet in length along foot wall and show ore all the way—not in solid masses but evenly distributed. This ore will average $50 in silver to the ton.

The whole face of tunnel of Belle claim shows a solid body of galena ore carrying about 50 ounces of silver per ton. About 50 feet in, a winze inclines to the west 45° and goes down 40 feet; the walls are galena. At bottom of winze a chamber has been opened about 20 by 30 feet. Ore, galena, and carbonates of good grade. At bottom of chamber an ore chute extends down 18 feet, connecting with main Belle tunnel. The ore falls away from the workmen, passes through the chute into the Belle tunnel, and from here, through a 100 foot chute, into Columbia tunnel.

The Hastings Consolidated Mining Company has a 20-stamp mill on the Surpriser mine which consumes 50 tons of ore per day, at a cost of $3.40 per ton in mining and milling, yielding $18.79 per ton, in gold.

The Surpriser mine has its main tunnel on a level with the ore-house in the mill. The distance between the mouth of the tunnel and the ore-house is about 100 feet. The tunnel is 700 feet long. At 80 feet they struck ore. They ran 82 feet in ore, and then cross-cut, showing an ore-breast of 132 feet. At this point the tunnel is 200 feet below the surface. Here they have sunk a winze on the ore-body 100 feet deep, at an angle of 65°. Thus, there is an ore-body ascertained to exist and in view 300 feet in depth from the surface, and 132 feet abreast. In the tunnel there are two parallel strata about 13 feet apart, that come together about 165 feet from its mouth. There are over 200,000 tons in sight, enough to supply the mill for the next eight years, and several other places may be opened very readily. There are 1,000 tons or more on the dump.

The Surpriser No. 2, the Windsor, Highland, and the Manhattan mines, also belong to the Hastings Consolidated Mining Company. This is a well-managed company, and it has the anticipation of a golden harvest.

The Oxford-Dover Mining Company.—There are two incline shafts on the Dover, which is the southerly location, each about 70 feet in depth. In shaft No. 1 the richest ore was found, but the vein was not so well defined at the bottom as the croppings would seem to warrant, and hence shaft No. 2 was sunk about 200 feet northeasterly from the shaft and towards the Oxford, upon the same croppings as shaft No. 1. There is ore all the way down to the bottom of shaft No. 2, the vein being plainly in sight at the bottom, as well as up the sides of the shaft. The assays, all the way down, were favorable. There would be no difficulty in following the vein down, as the country rock is not hard, and to all appearances the stratification becomes more regular as depth is attained. On the Oxford the tunnel was run in about 50 feet. The dip of the vein on the Dover is about 80° northerly, and on the Oxford 50° to 60° easterly. The course of the vein on the Dover is southwest and northeast, and on the Oxford north and south. The Dover crops diagonally to the stratification of the country rock, and the Oxford runs in the same direction as the country rock. The formation is granite, with numerous quartzite veins.

There are one main shaft and several small prospecting shafts, and a few tons of good ore on the dump. The quality of ore is argentiferous galena. In the main shaft, the ore-body seemed to break at about 15 feet from the top.

The Oxford vein lies between two hard stratifications of quartzite, and the chances are good for finding the vein by extending the tunnel about 50 feet farther under the shaft and then cross-cutting through the quartzite each way. The tunnel runs lengthwise on the stratification from a cross-ravine.

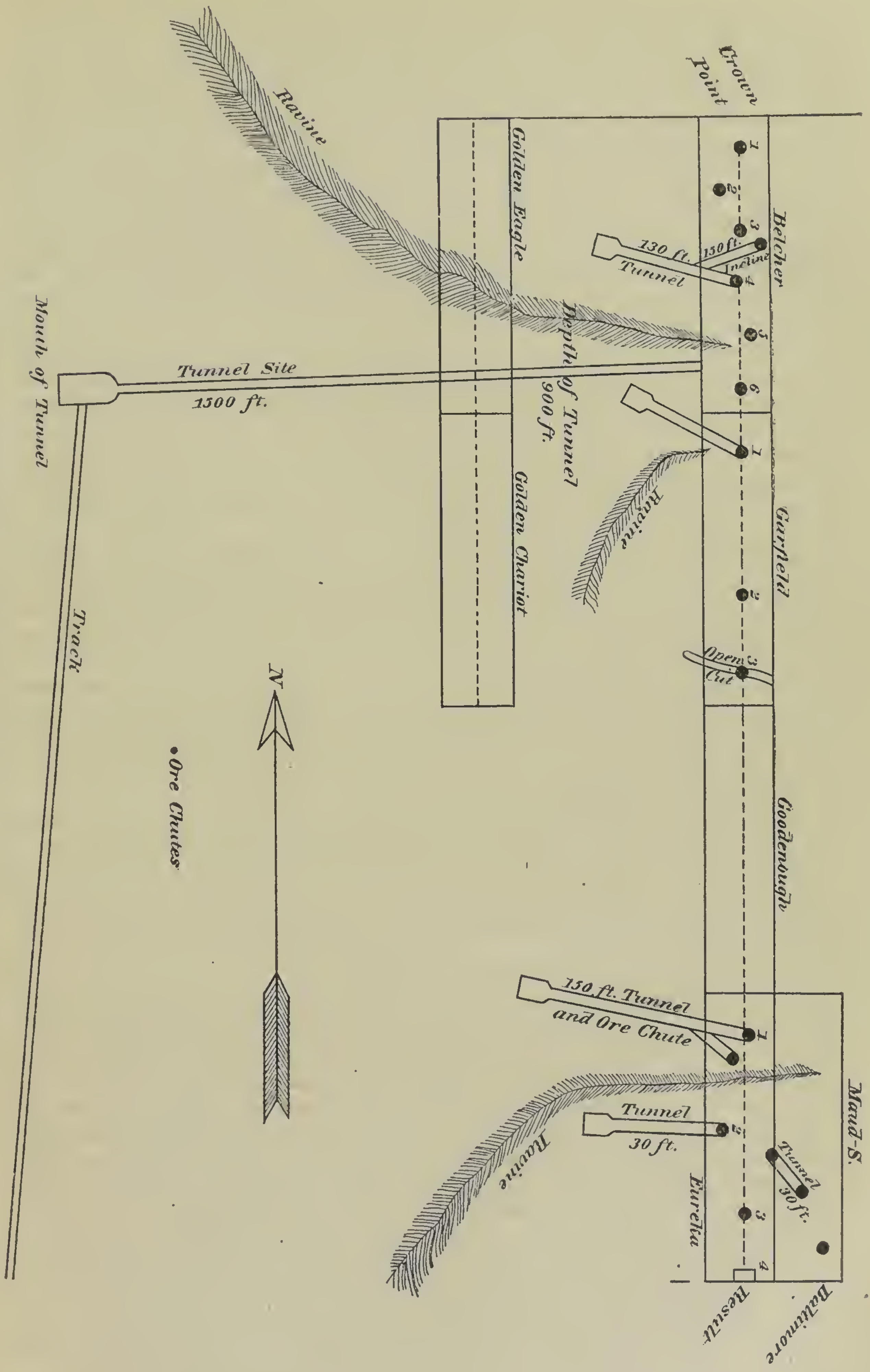
As regards situation and surroundings, the Oxford-Dover more nearly duplicates the Silver King mine than any location hereabouts. It lies about 1¼ miles south from the Silver King, and is about equidistant with the King from the limestone belt and the trachyte above the belt. The average assay of the ores is $315 per ton.

The Garfield group of mines comprises the Garfield, Belcher, Eureka, Golden Eagle, Golden Chariot, and Maud S. The company own in addition a tunnel and a mill site.

On the Garfield, shaft No. 1 is 60 feet deep, 5 by 9. It shows some fine ore that assays from $500 to $1,000. Shafts No. 2 and No. 3 show the same kind of ore.

On the Eureka, No. 1 ore chute, on the surface, is 18 inches thick and 50 feet long. The first level is at 30 feet, the second at 60, making 90 feet from the surface. The crevice is 12 feet thick at this level, with 4 feet of ore. The third level is 50 feet deeper; crevice is 15 feet thick, with 4 feet of milling ore in the foot wall, which yielded at the mill over $100 to the ton. From 60 feet in depth the ore is stoped out. This ore yielded over $150 to the ton. This ore chute is opened over 140 feet deep, and shows good ore all the way down from 18 inches to 4 feet in thickness. On the level it shows the ore chute to be 50 feet long. No. 2 tunnel is 30 feet long, all in ore, and 30 feet under the surface, all in low-grade ore. No. 3 is an open cut on the south end of the mine, showing 8 feet of ore, with some horn silver. No. 4, on the extreme south end, has a shaft in 10 feet, all in milling ore. They are situated in the foot-hills, on the western slope of the Pinal Range, nearly 3 miles south of the Silver King, on the same mineral belt, which also extends to a great distance north of the King and south of this ground.

This belt is dotted with locations its entire length, and several rich mines have already been developed thereon, among them the Surprise,



MAP OF GARFIELD GROUP OF MINES AND TUNNEL SITE.

the Mount View, the First Chance and Last Chance, the Alice Bell, the Pike, the Josephine ledge, with its numerous mines, including the Josephine, Amador, East Union, Lost Prize, and Rosalie; also the Grandfather ledge and its numerous locations. The Washington, Monarch of the Sea, Silver King, Bilk, Oxford-Dover, Hudson, Silver Queen, Webfoot, Erie, Coppertop, Lewis, Gem, Surpriser, Windsor, Manhattan, Cottonwood, Arco, Silver Chief, and Crown Point mines are all to the north of this group. To the south are the Result, Silver Bell, Savage, Mary Ellen, Silverado, Baltimore, and a large number of others.

The Belcher mine has a cut, marked No. 1 on the map, 30 feet deep, showing a vein 8 feet in width, horn silver and carbonates, that have pulped at the mill $127 per ton. No. 2 shaft is 60 feet deep, 6 by 8, has a 4-foot ledge at the bottom, carrying the same kind of ore. No. 3 is a chute of ore, without any particular work. No. 4 is another chute of ore, 50 feet on the surface, 4 to 9 feet thick, ore from which pulped at the mill $140 in silver and $15 in gold. A tunnel 130 feet long taps this ore chute at a depth of 100 feet. There is one air-shaft, 40 feet deep, in ore, striking the tunnel, and a winze 80 feet deep, same character of ore. No. 5 is a chute in ore. Shaft 20 feet deep, with 8 feet of ore in the bottom. The ore pulped from $40 to $150.

On the Maud S. there is one tunnel 30 feet deep, showing some low-grade ore; also one shaft of 10 feet.

Golden Eagle and Golden Chariot are undeveloped, but are on the same ledge with the Surpriser and Gem gold mines, showing good surface rock. The long tunnel in contemplation will run through the Golden Eagle and Golden Chariot ledge and tap the Belcher and Garfield at a depth of 900 feet.

The work on the Monarch of the Sea mine is progressing. One tunnel is now about 50 feet and the other about 75 feet long, following the veins. The matrix is about 3 or 4 feet wide and the pay streak 1½ feet wide. There is good ore, somewhat similar to the King ore. There are about 25 tons on the dump.

Owl's Head district.—The chief mine is in a cluster of hills, which rise to a height of 200 feet above the surrounding country. The vein is hidden by soil. A shaft has been sunk 22 feet deep, upon which the vein pitches at a slight angle into the hill. The country formation is porphyritic; the hanging wall shows, but no foot wall. Lying against the former is the pay streak, 2½ feet wide, which carries exceptionally rich ore. It has copper, silver, and gold in it.

The Jessie Benton is a practically developed mine, having a continuous lode, as shown by shafts and cuts, for more than 1,300 feet. The deepest shaft is 60 feet; the vein runs about east and west, and has a slight dip to the south. In one place a cut has been made 73 feet long, and the ore lies an even width of about 12 inches against the foot wall. The wall is exceedingly smooth and even, and the vein offers satisfactory proof of being a true fissure; there are places where the "pay" is 2 feet thick, and the whole of it is very rich. It has a 5-stamp mill at work upon its ore, which is milling upwards of $60 per ton. The ore is worked raw, and the amalgam shows that they are getting nearer to the rock every day. A steam siphon is so arranged as to return the water to the battery from the settling tanks at a less expense than it could be pumped from the well.

Among other properties owned by this company is a gold mine called the Eagle, which is said to be very rich.

San Pedro district.—The Silver Queen mine has a vein 3½ feet between walls, 28 inches of which will mill $3,000 per ton in silver. The ore is chloride, and, in addition to the silver, carries $24 in gold to the ton. This company is working on various cross-cuts on its 100-foot shaft, each opening up the same high-grade ore. Arrangements have been made to erect a 10-stamp mill on the mine.

The Yellow Hammer mine has a ledge 3 feet wide, and on the bottom of a 70-foot shaft is in high-grade chloride ore.

The Pioneer has completed its 10-stamp mill. Its ore is the same as that taken from the 400-foot level in the Silver King.

Ripsey district.—There are many ledges of copper in the district which may prove of value, but thus far they are only in a partially developed condition. The leading ledges, or mines, are the Amanda Black, Desdemona, Producer, Dividend, Chloride, American Flag, Mint, Peoria, Nashville, Fairy Belle, and Hunter, Jr. The seven last named are silver ledges of unquestionable merit.

Old Hat district.—The Empress mine is said to have a 2-foot pay streak of pure copper in its 6-foot ledge. On each side of this claim lie the Oakland and Empire, bearing the same species of mineral. The pay streak in these mines carries 80 per cent. of copper and $138 in silver. They have as yet been but little developed.

The Old Hat mine shows vein matter on the surface for a width of nearly 100 feet, lying in veins parallel to each other, varying in width from 4 inches to 3 feet. The main vein has been developed by slight surface working, one shaft of which lies near the center of the ground and has been sunk to the depth of 30 or 35 feet in exposing a streak of ore nearly 3 feet in width, solid in form and permanent in character. Average assays from the entire width of the vein, taken and pulverized without regard to sample or picked specimens, gave a return of $31.50 in gold. It is a fissure vein of strong character, which has been tested by shafting over 200 feet.

The Santa Catarina Copper Mining Company's property consists of a group of three mines, situated in the Santa Catarina Mountains—the Apache and Saint Nicholas being on the main ledge that girts the mountain's base, and the Midas, an immense ledge of copper-bearing ore, lying at right angles with the two named, and upon the lower end of which the reduction works will stand. The Apache is opened by a cut and shaft of 80 feet, which shows an ore-body of 32½ feet in width of solid carbonates of copper. The same quality is shown in the Midas, whose croppings extend over a surface of 600 feet. The whole of the ore averages in copper fully 25 per cent., with a sufficient percentage of gold and silver to largely repay the cost of separation.

Mineral Hill district.—The Specie Paying mine is driving a new tunnel, all in ore, 100 feet below the highest outcropping. There is no waste material, all being good pay mineral, which assays $42 per ton. The ledge on the Cholla is 32 feet wide, on the Wedge 50 feet, and May, 6 feet wide. There is a shaft 75 feet on the Cholla, and it shows horn silver and high-grade galena. A drift from the bottom shaft disclosed a body of high-grade galena. Some of the ore went as high as $2,500 in silver.

The Mark Twain, situated 2 miles farther north, has a 50-foot ledge. There is a large open cut on the mine, and a shaft from bottom of cut, 18 feet deep. The ore goes from $40 to $175, with from 40 to 70 per cent. lead. The only development is on foot wall. It is an iron-cap ledge, and can be traced for 8 miles.

What this district most needs are a custom mill and reduction works. Such an enterprise could be made very profitable. There is ore in abundance, of every variety, and at this time no less than 500 tons per diem could be supplied from the various mines.

The Bebee.—Work on this well-known mining ground will be started soon after the 1st of January, 1883. The tunnel on the mine is 70 feet long, pointing towards the shaft, calculated to strike it at 250 feet depth. The ore is galena bearing silver. The ledge is 14½ feet wide.

The Truckee is the northern extension of the Bebee. It has a 40-foot shaft, same class of mineral as Bebee. Vein and ledge similar.

Work on the Hollis mine shows a great improvement. The vein is 4½ feet wide between good walls of syenite and porphyry. Assays run from $204 to $500 per ton. It is free-milling ore with horn silver. The shaft is now 35 feet in depth. The Hollis is the southern extension of the Bebee mine, 7 miles southerly from Pinal.

Rogers district is 14 miles north of Pinal. There is plenty of wood and water in this district, offering facilities for mining and milling that are unsurpassed. The country rock is granite and porphyry. There are three main ledges running parallel, southeast and northwest, dipping to north, on which the chief development work has been done. The Snap, Chloride King, and Monarch are on one; the Columbia, Silver Chief, Manhattan, and World Beater on another; the Blanch, Dickens, Goodenough, and Plato on the third.

The Silver Chief was the first discovered in the district, in 1875, and is now the best developed mine in it. There is a 200-foot tunnel on the ledge, which is carbonate ore showing native silver, from 3 to 12 feet in width. Free gold has also been found in the tunnel. Assays of the ore go from $120 to $2,500. At a depth of 20 feet there is an 80-foot shaft to the surface. About 300 feet west of this shaft is another 60-foot shaft, at the bottom of which the ledge is 12 feet wide, and they are going to work in the tunnel to reach this shaft, which they will do at a depth of about 250 feet. Further surface work has been done on the mine, making altogether about 400 feet.

The World Beater has a 60-foot shaft and a 75-foot tunnel on the ledge. At latest developments the ledge is 7 feet wide, of chloride ore, assaying from $90 to $4,000. Native silver is found throughout. There are now on the dump about 40 tons of $120 ore.

The Dickens has a shaft 90 feet deep. The ledge on the surface is 4 feet wide, of carbonate of lead. In the last few feet they have struck extra rich carbonate ore. There are about 50 tons on the dump that will average about $160.

The Chloride King has two incline shafts following the vein, one about 30 feet in depth and one about 20 feet. The ledge is over 3 feet in width between walls, carrying a pay streak of about 14 inches. The latest assay gave $785.

The Manhattan has a tunnel started in about 30 feet, and expects to strike the ledge at 120 feet by running 40 feet farther. The ledge is from 1 to 3 feet wide, of the same character of ore as those already described.

The Robin has a shaft 30 feet down on a 3-foot vein of ore containing silver glance that will average $400. Some 300 feet east of this shaft is a tunnel in about 20 feet on the ledge.

The Plato, an extension of the Dickens, shows a stratum of rich sulphuret ore, which can be traced here and there for a distance of 200 feet. An assay made last week of surface rock from this claim went $320.

The Mabel and Glance adjoin the Columbia and Silver Chief on the west side of the mountain. The former has a ledge 14 feet in width, and the latter one of two feet, carrying the fine chloride ore characteristic of this district.

The Columbia, which is the first west extension of the Silver Chief, has a 40-foot tunnel on a vein about a foot wide; ore similar to that in the Silver Chief.

The Snap, a west extension of the Chloride King, has a shaft 20 feet, showing up a ledge of good ore.

The Monarch has a shaft down 40 feet in good ore.

There are many other good properties lying within this district, but mostly in an undeveloped condition.

The Copperosity mine is located 3 miles south of the Vekol mine, in the same range of mountains. It has a 10-foot ledge, assaying 30 per cent. copper.

Casa Grande district.—The Vekol mine is the leading one in the district. It grows richer as development work progresses. There are 700 tons of ore on the dump, which will mill upwards of $100 per ton. A mill will soon be erected. There does not appear to be a regularly defined ledge. The ore lies horizontal in deposits. The formation is limestone, with quartzite, talc, and porphyry. The ores are chloride, with lead, copper, and antimony.

The Jack Rabbit mine is showing high-grade ore thoroughly impregnated with malleable silver. No walls have yet been found to the ledge, but there is a pay streak, 2 feet in width, from which 8 to 10 tons of ore have been shipped, that went from $1,000 to $1,500 per ton. There are two shafts, one 50 feet and the other 65.

The Orizaba has several shafts, all in chloride and black sulphuret ore of a very high grade.

The White Flag is a well-defined ledge of carbonate and galena ore, which can be traced for many miles.

The Mineral World is a big blow-out, carrying gold and silver.

The Western Union is of a similar character, which crops out 40 feet wide for the whole length of the claim.

The Silver Bell has a shaft 60 feet deep on a 9-foot ledge, very rich in silver.

The North Star and Lone Star are on the same ledge, about 10 miles from Casa Grande. The ledge, which is from 7 to 10 feet wide, is opened up for the whole length of the claim. It assays from $25 to $30 in silver on the surface.

The Anglo-Saxon is a mine containing 45 per cent. of copper, a trace of gold, and $30 per ton in silver.

The Ready Cash and Tenderfoot are very promising claims.

The Reward mine, a valuable property, is making arrangements to have a smelter built.

YAVAPAI COUNTY.

This county embraces three degrees of latitude and two and a half degrees of longitude, and contains one-third of the entire area of the Territory. It has excellent grazing resources, but its agricultural industries are mostly confined to the valley of the Verde. Its mineral resources are large and varied, comprising gold, silver, copper, lead, coal, and salt. The presence of an ample supply of wood and water in all its mining districts is a great advantage.

The lack of railroad facilities, which has hitherto been a great drawback to its development, is now being overcome by the building of the Atlantic and Pacific Railroad, which traverses the county from east to west. It is now complete nearly to Prescott from the east, and is drawing attention to the immense mineral resources of this county.

The Tuscumbia, Silver Belt, Dosoris, Peck, Black Warrior, and its many other producing mines are daily pouring out a stream of precious metal, which will be increased by numerous other mines that are just on the eve of producing. These, not taking into consideration its immense output of copper, will attract capital and energy with which to develop the hidden treasures.

Tip Top district.—Reliable information comes from the Tip Top country showing the great richness of the mines in that section. The Tip Top mine has produced thus far nearly $2,000,000, and is still producing at the rate of $350,000 per annum. The mine is opened to a depth of 800 feet, and shows rich ore in ruby, native silver and sulphurets. The mine has been opened perhaps in a more thorough and workmanlike manner than any in Arizona. Every tunnel, drift, stope, and winze shows the supervision of a man who thoroughly understands his business, and who has learned in the school of experience the valuable lessons of judgment, economy, and common sense. About 100 men are now employed, three shifts of eight hours each, keeping up the work without cessation. The inflow of water is very light, and no inconvenience is experienced on that account. Drifting, stoping, and sinking is the work now being carried on. As greater depth is reached, the vein is steadily enlarging, and the hard character of the country rock becoming more pliable.

The north drift on the 600-foot level is now in 288 feet; and the south drift, on the same level, 225 feet from the main shaft; making 513 feet as the total length of the ore-chimney. The north winze on the 600-foot level is down 120 feet. The stopes above are looking as well as ever. The south winze on the same level is down 114 feet in 12 inches of ore, milling $200 per ton and much of a higher grade.

This mine has been an expensive property to open and develop, nevertheless it has paid its way and a number of fine dividends. With its present opening, much ore can be taken out with little expense.

Southwest of the Tip Top, Messrs. Rodenburg & Co. have a group of mines yielding high-grade ore, which are being developed in workmanlike shape. Their mines are located on Tule Creek, convenient to water and wood.

The Seventy-Six mine and mill are doing well.

Of the Cross Cut mine property no information could be obtained.

Peck district.—The Peck mine has within the year been working on its main shaft, which is now down 280 feet. The ore-body is from 10 feet to 4 feet, native silver and gray copper, and assays $450 per ton. The ores are shipped to Omaha for treatment.

On the Black Warrior mine work is being actively prosecuted and the shaft is now down 330 feet below the surface, at which depth cross-cutting is being done. The ore is from 3½ to 4½ feet wide and mills $175 per ton. Its ores also are shipped to Omaha.

Big Bug district.—In regard to the mining industry of this district Mr. Van Name writes: "I have an interest in only two mines—the Lottie and Leidy. The Lottie has a shaft 100 feet deep and a tunnel now running 275 feet to strike the vein, is now in 60 feet. Will strike vein at right angles 175 feet below surface. The vein at the bottom of the shaft is about 6 feet wide and 4 feet pay ore, free milling, very little sulphuret and lead. Will probably average over $100 per ton. Had several assays, one of $200 and some over $1,000 per ton. The Leidy shaft is down 25 feet. Only one wall, now 4 feet, carrying mineral. No assays; good prospects."

The Hackberry mine, lately developed by a 50-foot shaft, cross-cut in bottom 16 feet between walls, is said to carry 15 per cent. of copper and gold and silver $50 to $60 per ton. The Plata Bonita has sunk a shaft over 200 feet this past season, showing a good body of ore in the bottom.

The Silver Belt Silver Mining Company are erecting steam hoisting works, and are making a very successful run of their ore with a smelter. I have not been operating my mill, as ores in this district usually carry more silver than gold, except with some exceptions on surface, and have no settlers or amalgamators to save silver.

The Silver Belt mine continues to yield rich ore, and to-day its prospects are brighter than any other mine in the county. It has already produced over $300,000 by the smelting process. The ledge runs north and south, and varies in width, where the foot and hanging walls have been struck, from 10 inches to 3 feet. Four shafts, Nos. 1, 2, 3, 4, have been sunk, and two drifts run. Shaft Nos. 1 and 3 tap level at a depth of 60 feet. Work on this drift has been prospected nearly 400 feet south, and in but one place has the foot wall been found. It has been stoped entire distance to within a few feet of the surface. The formation is easy-working slate, and but little difficulty is experienced in taking out the ore. Ore is of a galenic or lead character, and works from $70 to $200 to the ton, with enough lead to pay the expense of smelting. Lower, or 150-foot level, is reached by shafts 1 and 4, and runs 800 feet south and 100 north. It is well ventilated and has been stoped a considerable distance. Ledge, as in the upper drift, runs north and south, and lies in a lime formation. Character of ore is principally the same, and is easily treated. Ledge, has been cross-cut in several places, but foot wall has not yet been struck. In the north end of this level a rich body of ore has been struck. It is of zinc blende, carrying rich sulphurets. Ledge at this point is well defined, and there is every indication of permanency. Ten feet of this ore has already been opened, widening from a few inches to nearly 4 feet. Miners are now coming back on ledge, with the intention, if possible, of finding the wall. Samples from this body of ore assay from $200 to $400 per ton. There is said to be over $500,000 worth of ore in sight in this mine.

The Belle mine is also a good property, and is being rapidly prospected.

The Great Duffy shows a well-defined fissure of about 5 feet between walls and an average ore streak of about 28 inches. The ledge matter is a white quartz, showing stains. They have had several assays running from $18 gold and $10 silver to $60 gold and $2,105 silver.

Work is progressing in the Middleton mine.

The Copper Mountain Mining Company has an immense ledge of rich ore of carbonate, assaying well in gold and silver. Two ten-hour shifts are at work at the mine, and the amount of ore placed on the dump is nearly 400 tons in the last five weeks. One shot alone threw down about 35 tons of high-grade carbonate ore. During the workings they are constantly coming across old shafts, drifts, and inclines. They have found several hammers, picks, and gads of stone, showing that the work in the mine has been done by some prehistoric race.

The Plata Grande mine, containing a large body of mineral, is a new discovery.

Tiger district.—The Tiger mine has opened a large body of ore at a depth of 325 feet, and its owners are of the opinion that it will reveal itself into another Comstock. The ore mills, so it is reported, $120 per ton. It has a ledge 18 feet thick, with 4½ feet on the hanging wall and

2 feet on the foot wall of fabulously rich ore, carrying oxides and native silver in large quantities.

Groom Creek district.—This district is being supplied with reduction works, which will be of great advantage to the fifty claims in the camp.

The Arizona Queen Mining Company own the Chicago and several other gold mines, the ores of which are sulphuret below the water level.

The Julia is producing gold from a 5-stamp mill. Much of its ore carries $200 to the ton.

The Adel mine has a shaft 60 feet deep, from which ore is being taken that will yield $97 gold and $50 per ton in silver.

Black Hills district is a recent discovery, 20 miles east of Prescott, in which some large and rich veins are attracting attention. The ores are mostly of a milling character, though they will need to be roasted. The average assays yield $85 per ton. Its mines are but little developed.

Castle Creek district is situated 40 miles south of Prescott. The Copper Giant mine has probably the largest vein of its kind in the county. It is easily traced for over 4,500 feet, is not less than 8 or 10 feet wide, and the croppings thereon are bold and immense. A tunnel across this lode shows a mass of decomposed matter, impregnated with copper. Above the tunnel and within the limits of the vein a streak of metal is disclosed some 15 or 16 inches in width. This vein, at a distance of 1,000 feet, is being worked by other parties, having the northern extension of the Copper Giant. The ore will assay from 50 to 80 per cent. in copper, and carries silver and gold. Copper float covers the mountain by which this great vein is intersected.

The other mines of prominence are the Collier & Co., Mayflower, Cushingberg, Jackson, Kentucky, Doubtful, and others which begin to assume the aspect of mines. This camp is easy of access, and has plenty of wood and water.

Hassayampa district.—The Howell Smelting and Milling Company own the Belle and Belle Extension, in which there is a main shaft sunk to a depth of 262 feet, and running north and south along strike of ledge for a distance of 140 feet, besides other shafts and tunnels. In all there are 600 feet of development on the two mines, showing, it is claimed, some 17,000 tons of ore. Average value of this ore is $40 in gold and silver and 40 per cent. in lead. This company also owns the Blue Dick mine. In connection with these mines the Howell & Co. have now in course of erection on Lynx Creek, near old smelter, a complete 40-ton reduction works, all of which will be of latest and most approved machinery and design, and in all its detail as near perfect as it is possible to be had.

The Dosoris mine is becoming very productive.

The Mark Twain is an important discovery of ore full of horn silver.

The Peacock mine is said to have a ledge 2½ feet wide, which is rich in free gold.

The Fremont mine is showing free gold in its 50-foot shaft.

The Consolidated Bodie is being developed and is having a smelter erected. The property is opened by two shafts, 80 feet and 100 feet, through tunnels, one 211 feet, one 75 feet, and one 22 feet, all in ore, showing the vein for a distance of 4,500 feet.

The Faro and White Spar silver mines are making a good showing.

Tonto Basin district.—The Osceola is showing large resources, while a decided change for the better is taking place in openings on the deposit.

The Gowan, Excursion, and Golden Wonder mines are pretty well developed and carry sufficient gold to make mining profitable.

There is one 10-stamp mill in the Basin, belonging to the Excursion Consolidated.

The Liberty mine, north of the Excursion, exhibits good ore.

Turkey Creek districts.—The Tuscumbia mine is pouring out a steady stream of bullion from its mill.

The Goodwin mine, which has been shut down for the past two years, is again being worked.

The Holmes has a shaft down 82 feet, all in ore.

The Homestake has a vein 2½ feet wide, which mills $455 per ton.

The Bullion has a shaft 50 feet on a 7-foot vein, 3 feet of which is solid ore.

The Chase mine and mill will soon produce bullion.

Weaver district.—In the early settlement of this region, Weaver discovered on the top of a high mountain rich placers, from which was secured over $1,000,000 in large nuggets. The country surrounding has plenty of gold in the earth, but, owing to the scarcity of water and the character of the clay in which the fine particles of gold are embedded, no great headway has been made; however, it is and has been the opinion of mineralogists and scientific men that very rich ledges exist in and around Weaver. To a limited extent developments have been made with very satisfactory results.

The Leviathan is a mammoth deposit, which must sooner or later attract the attention of capital to its rescue from an almost dormant condition.

In close proximity to the Leviathan is the Marcus mine, which produced $75,000 from ores shipped the first year.

The Van Arman shaft is down about 22 feet. The vein is about 7 feet thick, with well-defined walls showing a true fissure vein. The ore is of the same character as the celebrated Marcus mine, except it has a better showing of free gold.

The Minnehaha makes the best showing of free gold of any mine in the district.

The Wyandotte shaft is 40 feet deep, and has the same general characteristics of the Marcus mine, and is looking well.

The placers which are being worked by the Mexicans in this vicinity are paying well. There are many ledges of great richness in this district.

The Model mine, belonging to R. C. Powers, makes a fine showing of gold production.

The Plomosa mine has an ore-body producing 1,140 pounds lead and $81 silver to the ton.

Of *Copper Basin district*, C. C. Bean, of Prescott, writes as follows:

"I have discovered and located within the last year some very remarkable copper deposits and veins in Copper Basin mining district, 10 miles west of Prescott, at the western base of the Granite Range and between said range and Skull Valley, in Yavapai County, Arizona Territory. We have incorporated a company under the laws of Arizona, entitled the 'Copper Basin Copper Company,' and the company own a group of mines in this mineral belt, perhaps as remarkable for the extent, richness, and variety of ore as has been thus far discovered on this continent. The main feature of this copper field is the vast amount of conglomerate ore exposed to the eye; good and candid judges, mining experts, expressing the opinion that there are half a million tons of ore in sight, which can be worked or taken out of a great open quarry without hoisting works or pumping works. In addition to the conglomerate ore, there is a vast quantity of carbonate, azurite, red oxide, and black oxide mixed with metallic copper.

"Copper Basin gives evidence of having been at some period a lake, and the copper in the conglomerate ores was once in solution, and when the lake broke its boundaries the water then and since cut deep gorges or arroyos and left exposed great walls and vast beds of conglomerate ore.

"The names of the claims are as follows: Aztec, Pine Hollow, Coppersmith, Copper Nugget, Bonnie Doon, Red Bird, Blue Border, Cross, Blue Jay, Valley Forge, Highland, Copper Basin, Copper Chief, Quartz Hill, Carbuncle, Snow Bird, Bronze Statue, Stonewall, Outsider, Flood, and Chicago. Nearly all these claims lap on each other, and are 1,500 feet in length by 600 feet in width. The heart of this mineral belt is 2 miles in length by 1½ miles in width. The formation is porphyry, lying between granite and quartzite, the porphyry being highly charged with sulphurets (yellow) of copper (foliated) carrying gold. The porphyry cliffs are penetrated by iron veins carrying a good deal of metallic copper, and the conglomerate deposits are cut by immense veins of yellow pyrites carrying gold."

Walker and Lynx Creek district.—The Shelton mine has produced some gold bullion by arrastra process.

The Real del Monte, Capital, Eureka, American Flag, and the Gray Eagle are promising claims.

Of this district, Mr. C. Y. Shelton, of Walker, makes the following statement:

"It is situated 15 miles west from Prescott at an altitude of 7,000 feet. Howell and Co. have recently located a site for reduction works near the north end of the district. This company purpose to erect a 40-ton smelter. A 10-stamp mill, concentrator, and a saw-mill will be attached and bullion refined on the ground. The object is to work out from the Blue Dick mine of Hassayampa district about 7 miles, and from the Belle of Big Bug district, near the line of this district, distant about 2 miles, both mines being the property of this company. They will also sample and buy ore for their works. Part of the machinery is on the ground, buildings are going up, and a large brick kiln is under way. The works are on Lynx Creek, which penetrate the center of the district. The company will probably employ one hundred men.

"One mile further south is the Lynx Creek 10-tons smelter, which has just finished 150 tons of ore and is now leased by the Howell Company, who will put it in motion. One mile still further, S. B. Farnham & Co. are making preparations to erect a 5-stamp mill, machinery for which will arrive on the ground in a few days from this writing. This mill will work ore from the Wadley mine, which is situated on a large mountain about one-half mile distant. The Wadley has a tunnel in 150 feet; vein 6 to 8 inches, rich in gold and silver, and as yet entirely free; formation granite."

The Tic Tic, Henry Clay, Pointer, and others have been bonded by Eastern parties, and it is reported that the money is ready for the opening and working of the property. They are situated in a granite formation and but little developed.

The Fortune and the Champion are partly developed, showing 15-inch veins containing gold and silver. About 200 tons of ore have been worked, yielding $22 per ton.

South of them is the Shelton; shaft down 40 feet, ore-body 3 to 4 feet; the ore, carbonate and galena, assays $30 to $207 per ton. Three hundred feet south of the shaft is a tunnel, depth 140 feet, 60 feet from the surface showing ore of the same character. The veins run nearly north and south.

The Real del Monte, on the same belt as the Shelton, has two open cuts preparatory to driving a tunnel, one showing 2 feet of low-grade ore, while the other shows but a few inches of a higher grade ore.

The American Flag is located here. It has two shafts—one 13 feet, the other 300—showing 4 feet of ore, which assays about the same as the Shelton ore.

Eureka Hill seems to be crowded with quartz veins, most of them rich in gold and silver; the largest is about 18 inches. They are near each other and, it is thought, will connect at a certain depth.

The Capital is a silver mine, with average assays of $.85. A tunnel is in about 50 feet, expecting to tap the vein at about 90 feet and 60 feet from the surface.

The Gray Eagle is a large vein of low-grade ore containing gold and silver.

The Hidden Treasure has a tunnel about 200 feet, tapping one vein and driving for the second one; ore like that of Gray Eagle. The Mountain Lion, Eberhardt, Accident, Alturas, and many more, have each some developments.

The veins or lodes are fissures; many of them can be traced for miles. They are situated in a heavy forest. Roads are being opened and repaired; laboring men are in demand, and all is life and bustle.

The Hidden Treasure mine is having a mill built to work its immense dumps or rich ore.

Dake's smelter is working ores from mines mostly from adjoining districts.

The Soquel and Kiska Coquilles claims are being developed. At the north end of these claims, and immediately between the two, there is a fine mill site, beautifully situated, a natural road leading up a slight incline to it, and the shafts on the mine show already an abundance of water to run a mill, which drains the mine without extra expense. The Soquel and Kiska Coquilles are the north extensions of the Box Elder, Pine Mountain, and Fortune claims, owned by N. L. Griffin and J. M. Sanford. In the Fortune, at 15 feet depth, is a body of metal 40 inches thick, very base, carrying galena, zinc, and antimony, with iron and copper sulphurets, and assaying upwards of $100 in gold and silver.

Dr. S. B. Farnham, of Prescott, says:

"The Wadleigh & Mifflin, in Walker mining district, I have lately taken hold of; on the Wadleigh my tunnel is now in 138 feet, following the vein ore of free gold assaying $256.16 per ton; ore and vein matter 5 feet wide at the dividing line with Mifflin; have a shaft 15 feet. Further on the vein is laid bare by cross-cutting, and still further—making nearly 2,000 feet—by an open cut, showing the vein to be 7 feet wide. On the next location joining Mifflin on the north is a shaft 10 feet, all in ore. Four more locations were made on this vein, showing ore by large outcroppings and strippings the entire distance."

Dr. Farnham is about to start a working shaft between the R. C. and Soquel claims (which are parallel veins dipping towards each other and only 400 or 500 feet apart on the surface) with the intention of getting down 250 or 300 feet and then drifting to the veins and working both from one shaft. The land lies so that a mill can be advantageously located below the point selected for the shaft on a spot where wood, ore, and water are all convenient.

The Cabinet mine is a new discovery which is being developed. The lode carries gold and silver.

Walnut Grove district is located north of Weaver district. John F. Mahoney, esq., says:

"The first mining was for placer gold in a dry wash known as Placerita Creek, where a few Mexicans are engaged in dry washing, and produce on an average $500 to the man. A ditch is being constructed to bring water from Arrastra Creek, 2½ miles distant, into the richest part of this gold field. The whole of the ground in which gold is found is a soft, shaly slate or talc.

"Of the quartz claims I will mention the following:

The Hoods is the largest gold-bearing vein in the district. It is from 5 to 15 feet in width, with a pay streak of 2 feet showing free gold that will mill $20 per ton.

"The Constellation is in granite, and is a vein from 16 to 18 inches wide and opened by an incline shaft 50 feet deep. The quartz is white and very brittle. There is no regular pay streak. The pay is in the full width of the vein. Assay from samples from top to bottom of shaft gives $47, and works by arrastra process $40. The ore in some places in the vein shows considerable tellurium. This is a good indication to assort the ore by, as I find more gold where I find the tellurium. This ore is being worked by arrastra and pays well, as it is easily crushed.

"The Alta claim has two veins, which cross each other and form an X. One is silver bearing, the other gold. The former will assay from $75 to $400 per ton. On the surface is some copper and lead. No work has yet been done upon it. The Gold Run is opened by a shaft 30 feet deep, showing a pay streak 8 inches wide, and works $33.50 per ton, showing tellurium and free gold. The veins crop out boldly for 300 feet and are from 1 to 3 feet wide in a granite and porphyry formation.

"The General Sherman has a vein 20 inches wide which produces by arrastra process $50 per ton.

"The Maggie, from a vein of 10 inches, produces $75 per ton.

"The Machata claim is worked for gold by arrastras. The vein runs through porphyry and pays about $100 per ton; sometimes less, sometimes more. In the last three months about $1,700 have been taken out. The vein will average about 10 inches. The gold follows the soft iron in the vein, and is very coarse, round gold. The owners are at present working seven men and running four arrastras, and crush one ton to the arrastra each week.

"The Crescent claim has the only smelting ore that has been worked in the district. The vein is 3 feet wide, lying in a slate formation. The ore is carbonate, carrying over $100 in silver and 30 per cent. in lead. The ore is being worked in a Mexican furnace, which has a capacity of only five tons per month.

"The Wasp, running through the same belt of slate as the Crescent, is a gold-bearing vein of 2½ feet in width. It assays from $30 to $100 per ton. Men are getting up arrastras to work the ore. The gold is fine and in a porous or honey-combed rock, easy to crush. It has one shaft 60 feet deep.

"The Barnes claim is a vein similar to the Wasp, but larger. Not much work has been done on it, but there is an open cut and 10 foot shaft from which the ore worked $75 per ton. This runs parallel with and about 300 feet from the Wasp claim."

Mr. Mahoney estimates the production for this district for the year 1882 at $25,000, mostly in gold.

YUMA COUNTY

is rich in its undeveloped mineral deposits. Want of water, good roads, and proper transportation facilities are great drawbacks to the successful prosecution of the mining industry at all points save those bordering upon the Colorado River. With the advent of capital and enterprise its untold wealth will see the light of the world.

Silver district has for its western boundary the Colorado, a navigable river, with which the mines are connected by easy down-grade wagon-roads, from 4 to 6 miles intervening. Regular monthly steamers and a tri-weekly stage-route give every desired facility of communication with rail and wire at Yuma, 45 miles distant.

The ledges are clearly-defined fissure veins, sandwiched between a contact of porphyry and granite walls; a system of four ore channels, parallel, and with a regular trend northwest and southeast, traverse the district, showing an average width of 25 feet, and a length of unbroken iron-capped croppings from 5 to 9 miles in length. Wood in abundance throughout the mountains for camp purposes, and delivered at river landing at $3 per cord; water is now delivered by wagon at mines for $1 per barrel (40 gallons).

There are 27 miles of claims in this district on one ore channel, having 10 miles of unbroken croppings.

The more prominent mines are the Black Rock, with 20,000 tons of ore on the dump of a high grade, the entire shaft in pay ore, owned and operated for about a year by the Black Rock and Pacific Company of Boston, Mass. Development, beyond cavil, has placed this property among the leading mines of the Territory.

The Pacific North Extension of the Black Rock, same company, is a good property and in ore.

The Silver Tube is a showing of ledge matter, 20 feet in width on the surface, entirely iron-capped.

The Empire has a force of miners employed in sinking a shaft on its huge lode.

The Lost Mine runs 1,000 ounces silver ore. Black sulphuret ore is taken from it, and is in sight on its face, and encountered in various seams with gray carbonate, in sinking a 50-foot shaft; the most remarkable feature of this property being the gouge, which is a friable, variegated quartz, the only body found up to this time in the district. Cross-cut from 50-foot level of 59 feet in same ledge matter, which upon investigation proved to contain gold, and assays for that metal resulted in return of an average of 50 feet, $13.81, gold, per ton. An adit being run from the surface to connect with the east cross-cut of 40 feet has tapped the hanging wall of ledge, showing an 8-inch clay gouge, and the width of the ledge to be 70 feet and the foot wall not encountered. The discovery of gold in paying quantities on this claim has given an impetus in that direction to all ledges carrying quartz in the camp. In connection with this mine is a water-power mill-site on the Colorado River, sufficient to run 200 stamps; distance, 6 miles.

The Red Cloud or Silent is a property which sold for $100,000, and from which nearly as much was taken and reduced to bullion at their 20-ton furnace at the river; a very valuable mine, now idle. Ore of high grade from surface to 270-foot level, greatest depth. Red Cloud Gold and Silver Mining Company, of New York, are the owners.

The Rainbow is a huge, clearly-defined contact vein, showing a width of croppings from 20 to 40 feet the entire length of the claim.

The Nelly Kenyon is the first north extension of Red Cloud; various cuts and small shafts show one of the most promising prospects in this district with a good showing of ore in croppings; clearly defined contact fissure vein; croppings full length of claim (1,500 feet); wagon-road passing on side ground; mill-site at river, 4 miles distant. Ore milled from the tunnel, in this mine, yielded 40 ounces of silver per ton.

The Flora has a shaft, now down 50 feet, clearly in well-defined walls 4 feet in width. The ore is of a mixed lead formation.

The Medora continues to be developed, and improves constantly as depth is acquired.

The Offspring is being driven from the 48-foot shaft and a regular camp established on the grounds.

The Silver Glance is an extension northeast from the Black Rock, an incline shaft 236 feet just beneath the ledge, has been completed; 50-foot cross-cut to be run to determine the character of the ore and ledge stuff. From the surface of this property a number of shipments of high-grade ore were made to San Francisco, and at the 175-foot level of incline shaft the ledge was inadvertently tapped, and the result was the uncovering of black glance and blue sulphuret ore of exceeding richness, going into the thousands, and every indication of there being a large body. There is every prospect that this will become one of the leading mines of the district.

The Remnant one year ago could have been secured for $10,000. To-day it is the most remarkable mine in Arizona. An 80-foot shaft, for 60 feet in depth and 20 feet in width, with a drift 40 feet, is all ore, galena impregnated with horn silver. A vertical shaft 150 feet in depth, in a cross-cut of 18 feet, exposes an almost solid body of sand carbonates, black metal, and horn silver, and the hanging wall not reached. A shipment of 10 tons of ore from this mine sold in San Francisco in the sacks for $500 per ton. It is reported that the ore from this mine will mill on an average about $100 per ton.

The Klara is a valuable property, from whence rare vanadinite crystals have been taken.

The Rooster, Fannie, Medora, Melissa, Caledonia, North Star, Hamburg, Homeward, City of New York, Silver Cloud, Morning Star, and Rover are a few of the most prominent lodes.

The district has been visited and favorably commented upon by such distinguished authority as Profs. William Blake, Maynard, James Treadwell, Cox, Benjamin Galey, Riotte, Rollins, and many others, and all agree that there is here the most massive outcropping district in the Territory.

Plomosa district.—Work was commenced a short time since on the Wirt and Picacho mines, and the showing made to date is flattering in the extreme. The incline of the Wirt is already in pay ore that carries horn silver and chlorides. The tunnel on the Picacho is expected to cut the ledge at a depth of 100 feet and is now in about 15 feet. Work on these mines will be pushed forward day and night by an ample force of men.

Messrs. Canady & Vivian have commenced work on the Hecla, and intend to sink to a depth of 50 feet. This is a large ledge, carrying metal from the surface, and promises to be a veritable bonanza. Some excitement was occasioned in the district during the year by the discovery of a ledge, traceable for over a mile and cropping out of the mountain to the height of 10 feet. The ledge is reported to be about 8 feet in width and is heavily mineralized.

Alvarado district is a new camp opening up in good shape. It is situated 45 miles from Yuma. The ores are silver and copper carrying some gold.

Ellsworth district.—Some new and valuable mines have been found and the old ones are developing beyond expectations. The Socorro, belonging to the Oro Mill and Mining Company, is turning out high-grade ore, and the whole ledge will mill at a good profit. The main shaft is down about 50 feet, and the ore is steadily improving with depth.

The Oro, which is the property of the same company, looks extremely well. At a depth of 65 feet water has been struck in the shaft, which was something surprising to every one, but gives new life to the camp, as we can now calculate on an abundance of water for hoisting and reduction purposes without expense of transportation. So far the ore below the water-line is free milling, containing an exceedingly small percentage of sulphurets.

Developments in the Yellow Jacket mine are creating a great deal of excitement, uncovering a body of ore as fine as one would care to see. The shaft is down 25 feet, showing a 3-foot ledge gradually widening with depth.

The Good Luck is another mine which is coming to the front, and will in time show there are silver as well as gold ledges. The ledge is large and assays well in gold and silver.

This district will prove to be one of the leading ones in Yuma County when once capital takes hold. The whole camp is busy doing their best to develop their many promising ledges.

List of mining districts in Arizona.

Name of district.	County.	Name of district.	County.
Tombstone	Cochise.	Aztec	Pima.
California	Do.	Empire	Do.
Dos Cabazes	Do.	Silver Bell	Do.
Turquoise	Do.	Old Hat	Do.
Swisshelm	Do.	Pima	Do.
Hartford	Do.	Papago	Do.
Warren	Do.	Amole	Do.
Cochise	Do.	Greaterville	Do.
Tevis	Do.	Silver Hill	Do.
Russell	Do.	Cababi	Do.
Globe	Gila.	Helvetia	Do.
Mineral Creek	Do.	Wrighton	Do.
Richmond Basin	Do.	Copper Mountain	Do.
McMillenville	Do.	Chiricahua Mountain	Do.
Mineral Hill	Do.	Patagonia	Do.
De Frees	Graham.	Santo Domingo	Do.
Bunker Hill	Do.	Pioneer	Pinal.
Aravapai	Do.	Mineral Hill	Do.
Silver	Do.	Casa Grande	Do.
Mayflower	Do.	Quajate	Do.
Lone Star	Do.	Saddle Mountain	Do.
Cane Creek	Maricopa.	San Pedro	Do.
Winnifred	Do.	Old Hat	Do.
Magazine	Do.	Randolph	Do.
Myers	Do.	Rogers	Do.
Copper	Do.	Owl's Head	Do.
Aubrey	Mohave.	Yellow Stone	Do.
Cedar Valley	Do.	Palmetto	Do.
Greenwood	Do.	Huachuca Mountain	Do.
Maynard	Do.	Cale (?)	Do.
San Francisco	Do.	Mineral Creek	Do.
Hackberry	Do.	Agua Fria	Yavapai.
Mineral Park	Do.	Big Bug	Do.
Wallapai	Do.	Black Cañon	Do.
Gold Basin	Do.	Black Hills	Do.
Bently	Do.	Bradshaw	Do.
Lost Basin	Do.	Cherry Creek	Do.
Minnesota	Do.	Green Valley	Do.
Little Cottonwood	Do.	Greenwood	Do.
Peacock Mountain	Do.	Hassayampa	Do.
Wauba Yuma	Do.	Humbug	Do.
Junction	Do.	Martinez	Do.
Owen	Do.	Peck	Do.
Harshaw	Pima.	Silver Mountain	Do.
Washington	Do.	Tiger	Do.
Oro Blanco	Do.	Turkey Creek	Do.
Arivaca	Do.	Walnut Grove	Do.
Tyndall	Do.	Groom Creek	Do.

List of mining districts in Arizona—Continued.

Name of district.	County.	Name of district.	County.
Pine Grove	Yavapai.	Poor Man's	Yuma.
Tip Top	Do.	North Silver	Do.
Tonto Basin	Do.	Montezuma	Do.
Thumb Butte	Do.	Ellsworth	Do.
Crook's Canyon	Do.	Plomosa	Do.
Trinity	Do.	Weaver, No. 1	Do.
Weaver Verde	Do.	Weaver, No. 2	Do.
Walker and Lynx Creek	Do.	Humbug	Do.
Copper Basin	Do.	Eureka	Do.
Castle Creek	Do.	La Paz	Do.
Helvetia	Do.	Bill Williams	Do.
California	Do.	Haicurar	Do.
Castle Dome	Yuma.	Alvarado	Do.
Silver	Do.		

Estimate made by A. M. Lawyer of the bullion production of Arizona during the calendar year 1882.

County.	Gold.	Silver.	Total.
Cochise	$650, 000	$4, 800, 000	$5, 450, 000
Gila	50, 000	325, 000	375, 000
Graham	15, 000		15, 000
Maricopa	600, 000	100, 000	700, 000
Mohave	30, 000	100, 000	130, 000
Pima	75, 000	300, 000	375, 000
Pinal	10, 000	1, 200, 000	1, 210, 000
Yavapai	30, 000	400, 000	430, 000
Yuma	25, 000	100, 000	125, 000
Total	1, 485, 000	7, 325, 000	8, 810, 000

CHAPTER X.

NEW MEXICO.

This Territory is the oldest mining section in the country. Mines of both gold and silver were discovered, opened, and worked by the Spaniards long before it became a part of the United States.

The amount of the precious metals produced at that day is unknown. The mines were abandoned, their owners having been driven away by the Indians; and from a combination of circumstance they have not, until comparatively a recent period, been reopened, nor has the country been prospected for new mineral veins to the same extent as in adjoining States and Territories.

The Territory for a long time was subject to raids by the most warlike and fiercest tribes of Indians, and the country was not safe for prospectors, who as a general rule do not go into new mining sections in large bands, but operate singly or in small companies.

It has been only since the completion of the Denver and Rio Grande, the Atchison, Topeka and Santa Fé, and the Southern Pacific Railroads that the Territory has been fairly opened for prospecting, and discoveries have been made within the past two years that will bring New Mexico high in the list of States and Territories as a bullion producer.

The principal discoveries have been in the southern part of the Territory, in the Black Range of mountains, situated in Socorro, Grant, and Doña Aña Counties, where lodes or deposits of the richer ores of silver have been found, which in purity and size have not been exceeded in any section of the United States.

Of the extent of the deposits no information can be given at present, as the development at best is but small and insufficient to show that the mines have any degree of permanence, but the present indications are regarded as favorable for many of them becoming great and profitable mines.

In the northern and central counties of New Mexico many rich and extensive deposits exist, but mining is retarded by the fact that the mineral belts in not a few instances are situated on or covered by private land grants. In some cases these land grants—originally made by the Mexican Government and confirmed by the United States after the cession of the Territory—were located on agricultural or grazing lands, and it was only after the discovery of minerals in the adjacent mountains that by some methods of survey or resurvey their boundary lines were changed so as to include what will ultimately prove to be the most profitable industry.

The coming year will see a great increase in the bullion production of the Territory. Smelters and mills are being constructed, and shipments of ore for reduction in the East are increasing largely.

The following table shows the production of the Territory during 1882, estimated by counties:

County.	Gold.	Silver.	Total.
Bernalillo		$5,000	$5,000
Colfax	$20,000		20,000
Doña Aña	20,000	900,000	920,000
Grant	35,000	425,000	460,000
Lincoln	40,000	25,000	65,000
Santa Fé	25,000	15,000	40,000
Socorro	10,000	430,000	440,000
Total	150,000	1,800,000	1,950,000

BERNALILLO COUNTY.

Bernalillo County, in Central New Mexico, west of Santa Fé, hitherto has not appeared as a producer of bullion, but so far as the mountains have been prospected they seem to possess a fair share of mineral wealth.

The ruins of towns, smelters, &c., which are evidently of Spanish origin, point strongly to the existence at an early day of paying mines, from which their owners were driven by the Indians. Some of these old mines have been reopened and some new ones discovered, but they have not been worked to any great extent.

Sandia Mountains district is situated about 20 miles east of Albuquerque, and was located in 1879.

The Manzanita Company own a group of four mines, situated near the mouth of Hell Cañon. The ore is free-gold bearing and assays from $15 to $20 to the ton. So far as developed the veins show great strength of formation.

The Milagros was the first mine discovered in the district.

The Star has a vein of about 8 feet in width, ore from which has assayed as high as $150 per ton.

The Indiana, north of the cañon, carries galena rich in silver.

In Tijeras Cañon silver-bearing galena veins are found, and also copper prospects abound.

The Golden Gate mine has a 25-foot tunnel and the lode is of fine-looking ore. Assays satisfactory, and the mine is constantly improving.

Nacimiento district.—This district is situated in the northern part of the county near the line of Rio Arriba County. It had been long known that rich mineral deposits occurred in the Nacimiento Mountains, but no systematic effort was made to develop them until 1880, when the Nacimiento Mining Company was formed and several valuable copper claims were located on the west side of the mountains. The formation is sandstone, and the copper which contains silver is found as gray copper and glance. The amount of silver increases as depth is attained. The property of the Nacimiento Company comprises the Eureka, Eureka No. 2, Copper Queen, Copper Crown, Copper Prince, Gertrude, and Crown Prince. They have been opened and developed to a greater or less extent by tunnels, showing an abundance of ore that will yield 40 per cent. of copper and some that will run as high as 50 or 60 per cent.

The Eureka mine, which has more development upon it than any other in camp, and that less than $1,000, shows a body of copper 26 feet thick which will average 25 per cent. copper.

All that is needed now in this district are smelters. Everything else is there—ore, coal, iron, lime, water, and timber.

The richer mining districts south of Bernalillo County, in Grant, Socorro, and Doña Aña, have attracted the chief attention of prospectors and mining men during the last two years, and this section has not received that consideration which its mines deserve, but in a little time it will doubtless be favorably and better known.

In addition to the metalliferous deposits, coal, which is so necessary for mining and smelting purposes, is abundant.

Prof. N. A. Bibikov, of Albuquerque, informs me that the coal fields begin at a distance of about 30 miles west of Albuquerque, and, bearing a little to the north, they appear again near Gallup Station, 150 miles west of Albuquerque, on both sides of the track of the Atlantic and Pacific Railroad, and follow the railroad almost to the line of Arizona for about 25 miles. On this distance there are at present five companies working the coal beds; the average thickness of seams of coal is from 4 to 6½ feet; 10 to 12 miles north of the railroad they attain a thickness of from 7 to 9 feet, and near or on the Navajo Indian reservation seams 10 to 11 feet thick are found.

The production of the county during 1882 was about $5,000 in silver.

DOÑA AÑA COUNTY.

Doña Aña County lies east of and adjoining Grant County, and on the northern border of Mexico and Texas.

The Black Range of mountains, formerly known as the Mimbres Mountains, extending through the northeastern portion of Grant, terminate in Doña Aña County, and at the foot-hills lies *Lake Valley district*, about 14 miles north of Nutt Station, on the Atchison, Topeka and Santa Fé Railroad.

The general formation of the district is lime and porphyry, and the veins are contact, showing more perfectly where the greatest depth is attained.

Of the ores an iron carbonate predominates, though lead, carbonates, and antimonial silver are found in considerable quantities. The entire precious-metal-yielding area of this district does not embrace a space of over 2 miles square. The best portion of this is covered by the claims of the Sierra Grande, Sierra Bella, Sierra Plata, and Sierra Apache Companies.

The properties of the Sierra Grande Company are the Lincoln, Sumpter, and Emporia No. 1. These of the Sierra Bella include the Emporia No. 2, Strieby, Columbia, and Little Boy. The Sierra Plata Company own the Stanton, Crown Point, Golden Gate, Silver Reef, Arizona, Comstock, and Virginia claims, while the Sierra Apache numbers in its list the Surprise, Kohinoor, Crescent, and Grace Darling. The Sierra Grande and Sierra Plata have been consolidated and is known as the Sierra Grande Company.

All the above-mentioned companies, however, are controlled by the same men. The locations are all made across the vein, so that a full-sized claim is but 600 feet along the vein and 1,500 feet across it, up and down the hill.

The Lincoln, of the Sierra Grande group, has been the most developed, and so far the work indicates permanence and a large extent of the ore-body. At first it was looked upon as a deposit of indefinite extent, the vein being so large that its walls were not quickly discovered; but as work has progressed the foot and hanging walls are clearly defined, and it now appears that they have a vein from 10 to 12 feet thick, and growing richer, if possible, with each foot in depth. In this mine pockets or deposits of ore of extraordinary richness have been found containing masses of horn silver of great purity and value. The ore is chiefly chloride and carbonate, but is all of high grade.

The company has a 20-stamp mill, and is erecting a smelter. Only the lower grades of ore have been milled, and the richer portions reserved until the completion of the smelter.

The following is the treasurer's statement of sales of bullion:

1882.		
July 21	$17,110 34	
29	22,199 19	
		$39,309 53
Aug. 5	35,000 23	
15	27,955 48	
18	23,088 79	
26	48,261 83	
		134,306 33
Sept. 5	51,814 78	
8	20,322 69	
9	22,263 99	
14	40,241 13	
16	2,131 02	
27	44,758 45	
28	5,835 00	
		187,367 06
Oct. 14	14,842 39	
14	39,366 04	
16	19,728 27	
19	30,303 14	
21	63,212 59	
		167,452 43
Nov. 10	55,477 45	
24	131,257 81	
		186,735 26
Dec. 9	20,089 51	
27	61,698 72	
30	42,000 00	
		123,788 23
Total		838,958 84

The following description of the property of the Sierra Bella is taken from the Financial News:

"The property of the company includes five claims—the Columbia, of full length and 400 feet in width; the Strieby, nearly 600 feet wide and 1,500 feet long; while the Emporia No. 2 has the length of the Strieby, but half full width (300 feet); the Comstock and Last Chance together, 1,300 by 1,500 feet. The geological and topographical character of these claims is similar to that of the Sierra Grande. The most extensive outcrop is seen on the Strieby a short distance east of the boundary line of the Emporia No. 2. A shallow north and south cut exposes the ore-bed here for a distance of 250 to 300 feet. The outcrop extends nearly across the Emporia No. 2 in a width of 50 feet. It is also apparent in isolated bodies at three widely-separated points in the Columbia claim. A series of shafts on the Strieby claim, in a nearly north and south line, display the following characteristics: I commence with one north of the center of the claim. This is sunk for 10 feet on an iron vein. The next, southwest 100 feet, is 50 feet deep on an iron vein, and does not reach a foot wall. The limestone which appears alongside of the vein is regular, dipping 20° southeast. The first high-grade ore of this claim, running 15,000 ounces, was found in this shaft. The next shaft, 300 feet south, is sunk on an iron vein 30 feet, and has not reached the bed-rock. Limestone regular dip 15° southwest; iron assays 30 to 40 ounces. The most southern shaft is 100 feet south of the last, and is 51 feet deep. Twenty-six feet of it traverse drift of limestone and chert cobble-stones, and 25 feet of decomposed porphyry. Lime and iron are just appearing in the bottom of the shaft. The shaft, like those in the southern end of the Lincoln and Stanton claims, shows a valley in the limestone which has been filled by drift.

"The Columbia claim has the advantage of shafts at both of its extremities. The one at the northern end is on the edge of the steep descent which bounds the hill to the north. It is 40 feet deep, on a vein of argentiferous iron, and has not yet reached the main ore-body. The limestone formation surrounding it has the usual regular dip. Ore of a very good quality was taken and shipped from this shaft. At the southern end of the claim an incline was sunk by the former owners on an outcrop. This has been prosecuted to a length of 65 feet through good paying ore. The ore-bed then became conformable to the stratification of the limestone, and has been cut by a drift which runs on the bed-rock towards another shaft, 50 feet southwest. The ore-body is 35 feet deep and includes portions of extraordinary richness. An average sample taken by the manager from one of the faces assayed 445 ounces. The shaft above mentioned is near the Columbia. It is in lime, in places 18 feet, and then enters the iron. It has been demonstrated that the ore-bed of the Bella descends as we follow it southward. At a depth of 30 feet in a shaft of the Strieby claim it consists largely of a carbonate of lead ore, and continues to descend to the southeast until, at a distance of 200 feet, it is at a depth of 150 feet below the surface. The dip of the deeper part of the bed is less steep than a portion half way along the incline. The bed has a distinct hanging wall of a light color, from 4 inches to a foot in thickness, studded with pyrite crystals. It is probably a felsite tufa, like the so-called porphyry of Leadville. As a sedimentry material (as shown by Professor Julien) it does not indicate eruptive origin, but it does indicate the locality of a stream of fluid which is not likely to have originated near where it now occurs. Its presence strengthens the evidence in favor of the considerable extent of the bed. The bed of sand carbonates much resembles that which I saw in the drift southeast from Columbia shaft in 1881, and indicates that this ore-body has a large horizontal extent."

From the above it may be seen that the property of the Sierra Bella is equally valuable with that of the Sierra Grande. The ore-body or bodies are extensive, and their high grade has been demonstrated by the working of their original owners, as well as by the later ones of the company. An average of fourteen assays of samples collected from the Sierra Bella property is 601 ounces per ton. This is raised by the rich ores of the Columbia shaft, which are so impregnated with chloride of silver as to be best cut with a saw.

On the Sierra Apache but little work is being done, except of a prospecting character.

An ore-body has been recently found pitching south from the open cut on the Kohinoor. For the work done the ore is showing up in fair quantity and of a good grade.

The mining properties owned by the Sierra Grande are those to which general attention has been attracted; but there are a number of excellent prospects outside of their locations.

The district is covered with the same surface indications, and prospecting has shown the same kind of mineral in a number of claims. A camp that contains one such mine, however, as the Sierra Grande, is a wonder. And one such mine continuously working and producing as this one has been doing, will be a basis for a prosperous mining town, and a nucleus around which will always congregate an army of prospectors.

Hillsborough district is in the northwestern part of the county, on the Percha River, below Kingston. The camp was established in 1877. The ores are chiefly of gold, and in the early days of the district were worked by arrastras until the decomposed surface ore was exhausted and the heavy sulphurets reached, when operations were abandoned. It has been only within the last two years that work has been resumed, and since then has continued without interruption.

The Golden King and Bobtail are owned by Messrs. Bartleson, Galles & Co., and are being worked by a large force of men. The ore is free milling to a depth of about 50 feet, when it changes to a refractory sulphuret. The ore runs about $60, and is being treated at their 10-stamp mill at Hillsborough. In this mill they save much of the gold by means of plates, and concentrate the balance and send it to Denver for reduction at the Argo works.

The Bobtail has been opened to a depth of 125 feet, exposing a vein of from 5 to 6 feet in width, carrying heavy sulphurets of iron and copper.

These mines are being worked with a view of taking from 80 to 100 tons of ore daily, when a concentrator of like capacity will be erected.

There are other large veins of ores of copper, gold, and silver in the vicinity, which are fissures in a granite formation.

The country surrounding Hillsborough contains an immense amount of rich placer ground, and the only question as to these placers being worked successfully is how to obtain water.

The Hillsborough Hydraulic Mining Company, located at this place, is one of the largest companies in the county. They commenced operations on the 1st of July, 1881, and up to the present time have expended $250,000 in building reservoirs and laying pipes for their hydraulics. To complete their plans will require the expenditure of $100,000 more. They have built a dam and reservoir on the North Percha, and have laid 6½ miles of 15-inch pipe, and the balance of the 9 miles will be 12-inch pipe. If the water of the Percha River is found to be insufficient, an additional amount will be brought from the Animas River, 10 miles distant.

The claims owned by this company comprise about 4,000 acres, including a large amount of very rich placer ground. The main placers are about 6 miles from Kingston, but the only washing being carried on at present is within a mile and a half of Kingston, in Snake Gulch, where six men are employed, and cleaning up 4 ounces of gold daily. This placer will be washed out by the 1st of April next, by which time the pipe-line will be completed to the main placers.

This district has not been as thoroughly prospected or staked as many others, and offers good inducements not only to investors and miners but also to good prospectors.

Organ Mountain district is about 20 miles east of the Rio Grande. The ores carry gold, silver, copper, and lead.

The Memphis mine is in a lime formation; the ore is galena and carbonates. It is opened by shaft to the depth of 150 feet, and an 18-foot drift cuts the ledge.

The Merrimac, owned by Messrs. Littlefield, Meadows & Harrison, is producing some remarkably fine carbonates, assaying from $500 to $1,000 per ton. The vein is 3 feet wide, carrying pay ore the entire width.

On the Modoc mine there are 170 feet of workings. The ledge is 25 feet wide, being a contact between lime and granite. The character of the ore is galena and carbonates.

The Iron King, owned by Richie & Co., embraces an area of 2 acres. It has 300 feet of shafts and 600 feet of tunneling and cuts, all timbered and in good shape. The whole property is a bed of ore. Assays have reached $1,800 in silver per ton, and 40 per cent. lead. The shafts, one of which is over 80 feet in depth, have been sunk straight without regard to following the veins. It is proposed to reach the depth of 100 feet and drift. The ore is improving at every foot of development.

The Little Buck is being satisfactorily developed; a shaft 30 feet north of the ledge is being sunk to cut the vein. Ore taken from an open cut shows a fair quality of sulphide.

The Copper Duke, on Black Mountain, on the east side of the Organ Mountains, 6 miles north of the San Augustine Pass, is a late discovery. It is a contact of lime and granite, and is reported to be rich in free gold. On the south side of the mountain is the Lulu May. The Big Horn, Lone Star, and Gibson are also promising prospects.

Jarrilla district comprises the Jarrilla Mountains, 25 miles east of the Organ Mountains. The lodes extend northwest and southeast. All the ore is impregnated to a greater or less degree with copper in its various forms, and yields well in gold and silver, assays running as high as 76 per cent. in copper and from 15 to 79 ounces in silver.

The Egyptian group, comprising a number of locations, is yielding 66 ounces silver and a large percentage of copper.

The Paul Jones group, comprising several fine locations, yield 42 per cent. copper, $38 in silver, and $26 in gold on the surface.

The production of the county in 1882 was $20,000 in gold and $900,000 in silver.

GRANT COUNTY.

Grant County is located in the southwest corner of New Mexico, bounded by Arizona on the west and Mexico on the south; population about 9,000, seven-eighths of whom are Americans, and is one of the largest bullion-producing counties in the Territory.

The celebrated Black Range of mountains crosses the northeastern part of the county, and the portion included within the county limits contains some of its richest mines.

Percha district, composed of the North, Middle, and South Percha, is the chief district. Percha City and Kingston are the principal camps; the former on the North Percha and the latter on Middle Percha. It is comparatively a new district. Although the territory embraced within its boundaries was prospected more or less for several years, nothing in the shape of paying mineral was found until very recently. The country rocks are chiefly lime, porphyry, slate, and sandstone, the ores lying principally in lime and between lime and porphyry.

Percha City lies about 12 miles west of Hillsborough, and is but a few months old. It owed its origin to the discovery of a large quantity of argentiferous float upon a claim now known as the Solitaire, which is situated on the side of a very steep side-hill at the junction of two abrupt cañons in the North Percha. It is a knoll of magnesian limestone and fluorspar that is thrown up in the center of the cañon, while on every side the surrounding rock is quartz or porphyry. Over the eastern slope of this hill or ridge, which leads down to the creek, extraordinarily rich float ore is found. It is confined to a space of about 2 acres in extent. It neither overtops the crest of the hill, nor has it washed into the creek at its foot. The formation on the hillside is overlaid with a wash of about 3 feet deep, on which the float is found. This float is pure sulphide of silver; assays of pieces varying from one-half pound to over 300 pounds show them to be from 69 to 83 per cent. silver. Several tons of this have been found on the surface and at the depth of a few feet. Considerable work has been done trying to find the vein, but indications thus far show it to be a blanket contact between lime and porphyry, the mineral being found in a white talc highly impregnated with sulphide.

The Saint Clair is an extension of the Solitaire.

The next mine of importance is the Hillsborough, recently purchased by San Francisco capitalists. On this mine a shaft has been sunk to the depth of 48 feet, with the most satisfactory results. The ore is free milling, and assays as high as $560 to the ton. There is a body of ore in sight 12 feet in width which will average $300.

In close proximity to the Hillsborough is the Percha Chief. At the depth of 25 feet ore was found which assays $462.38 in silver and $73 in gold. At the depth of 48 feet—the present depth of shaft—the assays increase to $612.92 in silver and $97 in gold. The body of ore is the full width of the shaft, with inclination to widen as the work progresses. As the result of this encouraging prospect the owners are negotiating for machinery, and before another six months will be in a condition to make large shipments of bullion.

The Brilliant mine is one of the leading mines of the district adjoining the Solitaire. Here, as in the others, considerable work has been done. Two shafts have been sunk to the respective depths of 54 and 90 feet, out of which ore valued at from $350 to $800 per ton is being taken and placed on the dump preparatory to and in expectation of an early opportunity to reduce the same.

In connection with the Brilliant should be mentioned the Morning Star, it also being one of the boundaries of the Solitaire. Although not so much developed as those before mentioned, the indications are sufficient to guarantee that work and very little of it will bring it into the same degree of prominence as the mines around it. Assays at the depth of 15 feet run as high as $270 in silver, with a few dollars in gold.

The Moshannon and Osceola mines are being worked vigorously by old experienced Colorado miners, and give promise of taking rank among the best in the district. The formation is principally lime and porphyry. They have shafts some 8 or 10 feet on each, and the result is a rich body of ore, which equals that of the Hillsborough. These various claims are all contiguous to each other; in fact, they form an unbroken line, thus leaving no fractions.

In the Gem and its extension a shaft has been sunk 100 feet with 12 feet of ore in the bottom, comparing most favorably with any in the camp.

The Tahoka, Kelly, Lillie Gamewell, and H. Seely are a group of mines leading out from the Hillsborough, and each has a shaft or tunnel on it to the depth or length of 30 feet, and are piling upon the respective dumps ore that will mill free of all expenses from $200 to $300 per ton.

The Fay mine has a shaft down 100 feet. All the way down from the 60-foot level the character of the ore is about the same, only more brittle silver is apparent than has been found in the others.

The Gamage, Butler, Cora, and Burke are another group of good claims, on which but a small amount of work comparatively has been done. The outlook, however, is extremely promising, and it will require apparently but little labor to place them also on a permanent basis.

Much of the foregoing information relative to Percha district was furnished me by Mr. R. W. Caldwell, of Percha City.

The central camp for Percha district at present is Kingston, which is about 40 miles from Nutt Station, on the Atchison, Topeka and Santa Fé Railway, by the way of Lake Valley and Hillsborough, a good wagon-road connecting it with the station. Kingston is on the Middle Fork of the Percha, on the easterly slope of the Mimbres Mountains (now called the Black Range), and about 4 miles from Percha City. It is situated at an altitude of about 6,000 feet, and the mines are about 500 feet higher.

The principal mine is the Bullion, situated about a mile north of the town, and is reached by a good wagon-road of easy grade. It is located in a shallow gulch, near its head, which has evidently resulted from the erosion of the contact on which the property is located. The pitch of the vein is about 38° from the perpendicular, porphyry forming the hanging wall and limestone the foot wall. A shaft was first sunk in the limestone, on a chimney of ore striking towards the contact. At a depth of 60 feet $30,000 in silver had been taken out. The ore carries small proportions of copper pyrites and galena. The silver seems to be disseminated through a talcose and calcareous gangue that merges insensibly into the limestone that surrounds it. The average of the ore which was shipped to Denver for treatment was 417 ounces of silver per ton for 64 tons, the whole amount treated. The shaft from which this ore was extracted was subsequently abandoned, and another sunk a few feet nearer to the contact. After sinking 90 feet, drifting for the ledge was commenced.

The Superior joins the Bullion on the north. A stock company has been formed for its development, with a capital of $10,000,000. Governor George C. Perkins, of California, is its president, with J. B. Haggin, J. C. Logan, J. C. Hump, and Louis T. Haggin associate directors. George Hearst and other prominent mine investors are among its stockholders. The discovery shaft is about 200 feet north of the developments just described on the Bullion. It is on the same contact as the last named, and the developments are almost precisely the same, save that the drift on the Superior corresponding to that of the Bullion has been carried through to the ledge and a shaft sunk on the contact to a depth of 40 feet, showing a clean, smooth hanging wall. The gangue is not so strongly mineralized as the Bullion, as a rule, and the quality of the mineral has thus far proved greatly inferior to that of its neighbor, averaging 70 to 83 ounces. The Superior has also been opened in several other places—at two or three points on the contact and about five places in the limestone. These developments continue to prove the great extent and the irregularity of the deposit.

The Polar Star is the northern extension of the Superior, and is owned by the same parties.

The Iron Crown is a new discovery near the Superior and Bullion, carrying the same class of ore.

The Silver Queen, adjoining the Iron Crown, has considerable development, and work is progressing as fast as possible, a fine body of carbonates having been found in the adit.

The Comstock, Tom Paine, and John S. Phelps are also adjacent, and are promising properties, showing the same oxides of iron and manganese as were found near the surface on the Bullion and Superior.

The Iron King is about a mile west of the Bullion. It has two 80-foot shafts, with several drifts and cuts, which development, has demonstrated an immense ore-body, extending over the greater portion of the claim.

The shafts have proved at their present depth the permanency of the ore-body, though it is low grade, not averaging above 35 ounces of silver to the ton; but the large amount of carbonate of lead and iron which it carries makes it a valuable ore for smelting purposes. It also carries copper carbonates, chalcopyrite, and manganese oxide. It is a contact vein between lime and a bed of talcose slate.

The Andy Johnson is an extension of the Iron King, and its ores are similar. It is developed by several shafts.

The Black-Eyed Susan is also a contact vein between lime and slate, with the same character of ore as the Andy Johnson.

The Brush-Heap is a most promising mine.

The Kentucky shows carbonates of lead, with some bromide of silver, similar to the Andy Johnson.

The Illinois, which is fast proving to be one of the best properties in this part, has a shaft in rich ore, between slate hanging wall and lime foot wall. The vein varies from 1 to 4 feet in thickness, and was followed in 35 feet, with rich, hard carbonate ore, carrying chlorides and bromides, also native silver, and there is ore in the face. About half way an incline was started down on the contact, and the same average width of vein continues, with even richer ore than was found above. Eight tons of ore have been already sacked, and about 50 tons of rich ore is on the dump. The average of seven assays was $314.55 per ton. In lead it runs from 12 to 20 per cent.

On the South Branch of the Percha, about 2 miles south of Kingston, is the Gray Eagle claim, owned by Stacy, Arey, Routh & Cassil. Ninety feet of tunnel and open cuts. About $2,000 has been spent on development, and the owners claim they have $100,000 worth of ore on the dumps. The ores are sulphide of copper, galena, and carbonates; average value of gold, silver, copper, and lead, $240; vein matter, about 16 feet; 5 feet of galena, sulphide, and red and black oxide of copper. About 3 feet of the mineral runs 25 per cent. copper.

The Ontario averages 93 ounces silver, and has a 75-foot shaft upon it. The Itasca, Belcher, Baltimore, Silver Bell, Alice, Lancaster, and Philadelphia are also well regarded as prospects. Wood is abundant, with some good timber, but water is scarce. The Percha River is only one in name. At Kingston there is not more than 4 or 5 inches in the stream, but it can be obtained by sinking.

Thirty miles west of Percha district is Silver City, the county seat, about 45 miles from the junction of the Atchison, Topeka and Santa Fé Railroad and the Southern Pacific of California (at Deming). A branch road is under construction between the two places. Silver City is surrounded by flourishing mining camps.

Chloride Flat is about 2 miles west of the place, and is one of the oldest and most productive districts in this section of the Territory. The principal mines are the Seventy-six, Providence, Texas, and Two Ikes.

The Seventy-six is owned by the Bremen Silver Mining Company, which owns, also, the Backbone, Chloride, and Victoria. The claims are all in the one formation and cover an aggregate area of 79 acres. The gangue of the ore is heavy spar, sulphate of baryta, carrying embolite and sulphides, and 40 to 60 per cent. of it is free milling. All are alike upon a contact ledge, dipping 25° from a horizontal, with a slate hanging wall and lime foot wall. On the contact between the slate and lime the ore occurs frequently, running down into the lime in large bodies. The slate is frequently impregnated for a depth of 20 feet above the contact, with silver in various forms, sometimes as native silver in foliated form in the cleavages of the slate, again as shot or pellets of silver, varying in size from a pin-head to as large as a filbert, composed of sulphides of silver or silver glance, others of brittle silver, and yet others of red oxide of iron carrying silver.

A porphyry or trachyte dike runs the whole length of the valley parallel with the vein, about 450 feet away from the outcrop. As it has gained depth, there were less chlorides or embolite and more sulphides, the ore gaining correspondingly in value. The average value as returned by the mill has been about 48 ounces realized—the actual value about 50 per cent. more. The tailings were formerly allowed to go to waste, but recently they have been saved, until it is estimated there are full 6,000 tons on the dump, worth at least $150,000. The mine has not been worked exhaustively, but almost wholly for development, and the mining now in progress is of the same character. It is in the best possible condition for extensive work, with large bodies of ore exposed. At present about 10 tons are taken out, and the mill can treat only six.

The extent of the workings in the shafts and levels is about 1,300 linear feet; the greatest depth, 185 feet, except that in one or two places stringers extending into the lime below have been followed nearly 100 feet. Nor is it alone the ore-body in the lime which is worth considering. The overhanging slate, to an average depth of 10 feet, makes an immense aggregate of pay ore which will yield 20 ounces to the ton. The area covered to this depth is 1,200 feet long by 600 feet wide, and with a specific gravity of 3.5 will measure at a low estimate more than 1,000,000 tons.

The ore is hauled about 3 miles, and to the present time about 27,000 tons have been hauled to the mill. Until two years ago all the ore was brought out of the levels on the backs of Mexicans, in *tinatas*, or rawhide sacks, sometimes a distance of 1,000 feet. Hoisting machinery has been in use about four years, and for two years the ore has been hauled in cars along the levels. There is no water in the mine, and but little timbering has been necessary. Twenty-five men are employed in the mine and as many more outside. The total product of bullion in the ten years has amounted to almost $1,500,000, most of it going to the Eastern market.

The only means of treatment to the present time have been the stamp mill and pan process, the present plant being of ten small stamps. The mill is by no means such a one as the necessities and the capacity of the mine demand. It is located in the lower end of the town where there is water sufficient to run 100 stamps. First-class fuel—juniper, excellent for steam purposes—costs $3.50 delivered at the mill. Recently six Frue vanners have been ordered from Fraser & Chalmers to treat the great accumulation of tailings, one of them having been thoroughly tested for that service, and they will soon be in position and at work.

The Providencia adjoins the Bremen property, but is higher on the hill. It has been opened for several years and worked rather irregularly. The formation here is limestone with a contact of slate and porphyry. The ores are principally chlorides, with bromide, brittle silver, silver glance, native silver, and carbonates. The gangue is almost exclusively heavy spar and iron with very little siliceous matter.

This district presents a good field for extensive mining operations; the deposits are large and much of the ore is rich, and although the mines have been in operation for some time, yet it can be said that they are scarcely opened.

Pinos Altos district is located about 9 miles north of Silver City, and the town of the same name was formerly the county seat of Grant County. This district is the only part of the county where placer mining has been carried on to any extent, mining having been conducted here in 1859. The four principal ravines are Bear, Whiskey, Santo Domingo, and Atlantic Creeks, but there are a large number of smaller gulches emptying into them; they can, however, be worked only during the rainy season. It is still a camp of considerable importance and sustains a small population. The greater part of the placers have been exhausted, but are still worked, chiefly by Mexicans, as each freshet brings down an additional supply of gold from the mountains.

For some time the lodes also have attracted attention and been worked with considerable profit. The formation is granite and the veins are true fissures, many of them very strong and of good width.

The gangue is composed of more or less decomposed quartz until 75 to 100 feet in depth is reached, when the ore usually changes to iron pyrites carrying some copper pyrites and occasionally galena and zincblende.

The surface ores have been worked by arrastras which have successfully extracted the free gold. The sulphurets cannot be treated by this method, and on many of the best mines but little more than assessment work has been done, the owners awaiting the construction of a railroad to Silver City and the introduction of improved machinery of large capacity for concentrating and reducing the baser ores.

The Pacific No. 1, Pacific No. 2, Atlantic, Aztec, Langston, and Minnie Grande are some of the principal mines. A great deal of the surface quartz has been mined and milled with generally good results, but no great depth has been reached.

Within the last year a number of new mines have been opened on the western edge of the Pinos Altos gold belt, which occur in a contact of lime and porphyry and carry immense bodies of lead ore in an iron gangue, and are sufficiently rich in silver to furnish the basis for a successful smelting enterprise on a large scale. Three or four hundred tons of these ores were shipped chiefly from the Red mine in the western part of the district.

The production of the district during the year was reported by Mr. John McDonald—to whom I am indebted for much of the foregoing information—as $27,900.

Central City district is situated 9 miles east of Silver City, on the table-land below the mountains on which are located Hanover and Santa Rita. It contains many promising mines, some of them being fissure veins in granite, carrying gold and silver in a base of galena and pyrites. Others occur in porphyry, and are rich in carbonate of lead and galena, and rich enough in silver to justify treatment in a smelter. There are almost inexhaustible bodies of low-grade ore that will pay from $10 to $40 per ton. The great need is development and suitable machinery for the treatment of the ores.

About 2 miles from Central, on what is known as Copper Flat, is a group of seven mines owned by Walker & McAllister. The principal one is the Santa Domingo, which has one shaft 40 feet in depth, and another 50 feet. This shows a contact vein between granite and lime, the vein at the surface showing a width of 100 feet, and can be easily traced for a distance of 3,000 feet, while both shafts are in ore their entire depth. This ore assays 15, 23, and 33 per cent. copper, and from 3 to 5 ounces silver. The company own also the Homestake, situated about a half mile above San José, on the road to Santa Rita. It is a fissure vein developed by a shaft of 50 feet, and shows 2 feet of rich silver ore. The Sorrel Top is one of their richest claims, it having about 14 inches of carbonate ore which assays as high as $7,000, and averages about $100 per ton. The Shannon is still another of their promising claims. With a shaft 60 feet in depth it presents an ore-body of about 3 feet, which is claimed to run $65 silver per ton.

The Comstock lode, owned by Messrs. Corcoran, O'Brien & Atwood, is a promising claim. Upon this property a shaft has been sunk to a depth of 30 feet, and near the bottom of the shaft a 2½-foot vein of fine carbonate ore was discovered, which runs 70 ounces silver per ton.

At San José is also the San José Mining Company, a Baltimore enterprise, the stock being held principally by Pope, Cole & Co. The company are at work grading ground and receiving lumber for a smelter, which is on the road. They employ 35 men, and are working the San José mine. It has two shafts, 100 and 140 feet deep, the two shafts being connected at a depth of 100 feet. There are about 200 tons of ore on the dump and a large body in sight.

At Santa Rita, about 15 miles from Silver City, the chief operations are by the Santa Rita Copper and Iron Company. This company has been in existence less than two years, and is composed principally of Boston capitalists. The company own several mines and a large tract of land, including a large deposit of magnetic iron ore, the iron being free from sulphur and phosphorus. This property contains the old Santa Rita mine, which was so extensively worked by the Spaniards.

The property held and patented by this and the Bonanza Development Company—the mother company—aggregates from 1,000 to 1,200 acres. The principal workings are in the Romero, below the old Spanish workings. Across the little creek which supplies the mill with water, the Development Company are prospecting in other old workings, using only a horse whim for hoisting; and on a small hill not far from the Romero the Oxide is yielding, with a small force, a good showing of carbonates running 20 to 30 per cent. copper.

In the next valley below is the Guadalupe, which is now idle. A diamond drill is being used for prospecting and is now going down upon a second lode, the first one having been bored to a depth of 350 feet. The ore is native copper, considerably oxidized near the surface, but essentially native copper, found in sheets and in masses, occurring in porphyry, and in belts varying from 50 to more than 100 feet in width. The Romero is now being worked in the fourth level at a depth of 330 feet. The total depth of the ore-body is not yet determined, nor is its extent. It is supposed that the two principal workings, on either side of the creek, are upon one belt, and the Guadalupe on another, separate and distinct. It varies greatly in value as taken from the mine, running from a very small percentage up to as much as 50 per cent.

The ore, so far as at present developed, is found as a deposit of a similar character to the silver deposits at Lake Valley, Georgetown, and Silver City. It is supposed to be underlaid with limestone, and may have come from a contact vein, although there is nothing to show it as yet. The porphyry spreads over the whole country in various forms, with beds of quartzite at intervals. The porphyry is not found in dikes as at other places, but is all-pervading throughout the surface formations. As to the area of the deposit, there is nothing more definite than as to its depth. The present company has drifted in different directions from the working shaft, in all about 3,000 feet, to the greater distance westwardly. As before stated, this belt varies from 50 to 100 feet in width, with no indication yet as to how far it extends to the east or to the west.

The shaft of the principal mine is thoroughly timbered, with double compartments, and modern cages are used for hoisting, with two drums independent of each other. Formerly the ore was hoisted in buckets by a single shaft. A smelter was employed a portion of the time, and will continue to be hereafter. The crushing-plant was a 20-stamp mill, which has been abandoned on account of the loss in working, and Cornish rolls have been substituted.

The ore first passes through the Blake crusher; thence, after sorting, to the Cornish rolls; thence to Collom jigs, the same as used successfully on Lake Superior, but embodying the latest improvements. The slimes are treated on Evans' revolving tables. Ninety-two per cent. of the copper is now saved in treating the ore, an improvement of fully 20 per cent. over the old process; at the same time the expense is reduced almost one-half by reason of the much smaller force of workmen required.

Hanover district, northeast from Silver City about 14 miles, includes Hanover Gulch, which commences near the Santa Rita mine and extends for several miles, containing one of the strongest mineralized belts in the county with a great variety of ores. Lead, copper, and iron abound in various forms and carry gold and silver in varying proportions.

The copper and iron ores of this district usually occur in a feldspathic porphyry, but sometimes on a contact of lime and porphyry, while the carbonate and galena mines are found on the same contact, or wholly in lime.

The Emperor William group is one of the chief silver-bearing properties, and consists of six claims, the principal of which is the Silver Bird. This mine has been opened by a tunnel 50 feet in length, and at the breast of the tunnel shows an ore vein 4 feet in width between limestone and quartzite. The ore is lead carbonate and carries some gold, 25 ounces silver, and from 50 to 70 per cent. lead. The other claims in this group are also showing well for the limited amount of work expended upon them, and as soon as sufficient work can be done application will be made for patent upon these properties.

The Willis mine is another of the fine carbonate of lead properties in this locality. It shows a large body of ore, but has been opened in such a way that it is impossible to tell its width. It is claimed that the ore averages 40 to 50 per cent. lead and $35 silver, while it has gradually increased from 20 ounces silver at the surface to 95 ounces at 60 feet.

The Philadelphia group is composed of five claims, which have altogether three veins.

On the Philadelphia mine a tunnel is being driven to intersect all three veins and thoroughly develop the property. Two of the veins are each 6 feet in width, and the other 12, the latter showing only 6 feet at the surface, while one of the 6-foot veins only showed 2 feet at the surface. The ore is pyrites and black oxide of copper. Thus far the value of the ore has been about $30 per ton, although quite a quantity of it has been sold for $35 per ton, the additional $5 having been paid on account of its superior fluxing qualities.

The Iron Head has been opened to a depth of about 20 feet, showing an iron cap of 2 feet, below which is a body of ore shown by an open cut to be 20 feet in width, while from the croppings of rocks upon each side it appears much wider. The ore is between porphyry and lime and averages about 20 per cent. copper.

Near the head of the gulch is the old Hanover mine, which was extensively worked at an early day. This mine has been allowed to cave in, and little can be judged of it, excepting from fine specimens of carbonate and oxide of copper found on the dump.

The Eighty-one mine, an extension of the old Hanover mine, has a shaft 22 feet deep; shows black oxides and carbonates of copper assaying from 12 to 36 per cent.

The Iron King, in the same vicinity, owned by Cassidy & Parker, is being rapidly developed. It has a tunnel of 57 feet to cross-cut the ledge at a depth of 90 feet, and the owners have just struck the north side of this ledge.

The Hornet mine of the same parties, with an 11-foot shaft, shows well. The ore, according to mill tests of 10½ tons worked at Oak Grove, yielded 14 per cent. copper.

The Jim Taylor, owned by Hutchinson & Shanley, has been opened by two tunnels, 51 and 63 feet, and a shaft 76 feet in depth, while at several other places the ore-body has been exposed at the surface. It is a contact vein, between granite and porphyry, and would seem to be several hundred feet in width. The ore is a carbonate of copper, which assays from 8 to 70 per cent., while a large number of assays of ore in the tunnels give an average of 14½ per cent. The vein is readily traced through the Iron Head, the extension south, and for a long distance through the Philadelphia group, and to the property of the Santa Rita Company.

The Albion property is a group of five claims situated near the head of Hanover Gulch, owned by Johnson & Porter, of Silver City. This property is opened to a depth of 130 feet with an incline. At a depth of 70 feet levels are driven, one running north on strike of vein to a distance of 40 feet, and on the trend south a distance of 35 feet. The faces of each drift are all in good ore carbonates and black oxide of copper. The width of the ore-body is not known, as the hanging wall has not been reached at any point. This vein has been opened at different places for a distance of 1,800 feet, showing large bodies of red oxide and gray carbonate of copper, connected with an immense dike or vein of red and brown hematite iron ore. So far as developed these large ore-bodies average about 15 per cent. copper as the net results of smelting. It is a valuable property, and the owners are developing it with a view of placing machinery and a smelter of their own upon the ground in the near future.

Georgetown district is about 22 miles northeast from Silver City, with Georgetown as its mining camp. Three miles from Georgetown are the Mimbres River and Valley. On this river there are two stamp mills and a smelter which treat the ores that are mined at Georgetown.

There are a large number of prospects in this district, but only a few have been developed into paying mines. Chief of these is the Naiad Queen, McGregor, Commercial, and Satisfaction.

The Naiad Queen is owned and worked by the Mimbres Mining Company, the superintendent of which, Mr. S. S. Robinson, is my informant relative to the mines of the district.

The productive mining of Georgetown district hitherto has been done upon two classes of veins.

The first class has been more largely worked, and is a contact vein lying nearly flat and between slate and lime, the slate, from its unequal erosion, varying from a few inches to 300 feet in thickness, lying upon a belt of lime—Upper Silurian—some 400 feet thick, merging into sandstone in its lower sections, and resting on quartzite. In this vein the ore occurs, not in a continuous sheet or stratum along the line of separation of the two formations, but in a series of sags or water-ways along the surface of the lime, usually following the line of slight fissures in it, and occasionally cutting down from 10 to 40 feet in depth, carrying some ore. Some of these deposits are very rich, but they occur in a manner so irregular and uncertain as to largely increase the legitimate risks of mining.

The second class of veins has been less developed or worked. The veins are nearly vertical, and occur along the lines of separation of the bedded or stratified rocks and dikes of eruptive porphyritic rocks that protrude through them. The ores in both flat and vertical veins are mainly chlorides, chlorobromide, and argentiferous galena, associated with oxide of iron and a siliceous gangue. The chlorides and chlorobromides are free milling, amalgamating readily in pans with quicksilver. The galena and other sulphurets are concentrated and smelted, but they are only about 10 per cent. of the ores, and give less than one-tenth of the bullion product. The ores are worked to about 85 per cent. of their assay value.

The mining property of the Mimbres Company comprises eight claims, full and fractional, covering an area of about 140 acres. Crossing the property are two main porphyry dikes having a length altogether of some 5,000 to 6,000 feet.

The mining work of the past year has been the sinking of shafts and winzes some 350 feet, running some 1,200 feet of levels on the vertical vein, and 2,700 feet of levels on the flat contact; stoping 400 fathoms on the vertical, and 500 fathoms in the line along the flat contact. The deepest point in the mine 500 feet from surface, 370 feet in line. The product was 193,736 ounces of silver bullion, averaging 950 fine.

Mr. William A. Smalley, of Georgetown, has furnished the following description of the mill of the Mimbres Company:

"The mill is of 10 stamps, situated about 3 miles from the mines. The ores treated at the mill consist for the most part of chlorides of silver and what is known as black metal (a partially decomposed lead sulphide and carbonate, carrying silver) scattered through the ore in varying quantities. The gouge is a lime quartz carrying considerable quantities of iron and lead oxides. The high-grade ores, running at times as high as 1,500 to 1,800 troy ounces of silver to the ton, together with such portions of the ore carrying galena, are kept separate and sent directly to the smelter, which is attached to the small 5-stamp mill located half a mile lower down the river and belonging to the company.

"The ore as it is hauled from the mine is unloaded on the platform at the top of the mill or placed in bins. From the platform it is shoveled on screens, the fine material falls directly into the bins supplying the automatic stamp-feeders, and the coarser portions roll on a second platform in front of the rock-breaker. They are passed through this machine (a 7 by 12 inch Blake rock crusher) and reduced to a size suitable for stamping. From the inclined bins or chutes the ore discharges itself into the automatic feeders—one for each set of stamps—which supply ore to the heads as fast as reduced. These Challenge feeders consist merely of a sheet-iron hopper with a rotating bottom, motion being communicated to the bottom by means of a ratchet worked with a rod. The head of the rod is struck by the tappet on one of the stamp stems, the force of the blow depending on the amount of material under the stamps at the time, thereby regulating the feed.

"The stamps are of the ordinary style, weighing 750 pounds, and making eighty-four drops per minute. Each stamp will crush in a day of twenty-four hours 2 tons of rock. Two-inch pipes supply the water for each set of stamps. From the battery a trough conveys the liquid pulp to the settling tanks. These tanks, 8 by 6 feet in size and 3 feet in depth, are placed at a lower level arranged in a double row within a few feet of the pans. By means of a system of troughs and gutters the pulp is directed into any tank desired, and passes in turn through a half dozen or more tanks, depositing in each a portion of the suspended metallic particles, till finally it is allowed to flow into the tailing trough. The pulp when settled in the tanks is then ready for introduction into the pans.

"The pans in use are what are known as the combination pans, and are 62 inches in diameter. They are eight in number, and extend in a line across the mill in front of the settling tanks. They are run at a speed of sixty-five revolutions per minute, and in twenty-four hours are charged three times, giving eight hours to each charge. A single charge consists of 1,600 to 1,800 pounds of crushed material. This is shoveled into the pan and water added till the pulp has attained the proper consistency. About 1 per cent. of common salt and 4 ounces of sulphate of copper or bluestone are used to a charge. Steam from the boiler is admitted into the pans for a few moments to raise the temperature to the desired point. The mercury or quicksilver is introduced by another pipe leading from iron tanks placed between each two pans. The amount of mercury used to a charge varies according to the richness of the ore, but it is generally from 100 to 150 pounds. The mullers are kept raised from the pan bottoms, and no grinding is done, it being deemed far more economical to reduce the ore to the proper size for amalgamation in the battery. The rotary motion of the muller, together with the curved surfaces of the iron wings projecting from the sides of the pans, intimately mingles the contents of the pans and brings in contact the mercury with every particle of ore.

"The action of the chemicals is small. They aid somewhat, in connection with the iron of the pans, in decomposing the sulphides present and in forming silver chlorides. The copper sulphate also serves to free the mercury of lead, which destroys its amalgamating power. A few ounces of lye is also used to rid the mercury of greasy impurities. After running eight hours the contents of two pans are drawn off through spigots near the bottoms of the pans near the settler, and freshly charged. These settlers are large wooden tanks 8 feet in diameter, with iron bottoms and mullers, and make ten revolutions per minute. Fresh water is added, and the finely divided particles of amalgam and mercury collect in the bottoms, and the lighter and sandy portion of the ore is drawn off from time to time from the spigots in the sides of the settler at different heights, flowing into the tailing launder and thence into the tank prepared for them. A portion of the amalgam and uncombined mercury flows from the bottom of the settlers through an iron pipe into canvas strainers made in the shape of an inverted cone. The canvas retains the amalgam, but permits any excess of mercury to pass through. It is collected in a receiver and flows from it into a hydraulic ram, by which means it is forced back into the small mercury tanks ready for use again in the pans.

"When a clean-up is made, which is usually done every few days, the bottoms of the settlers and mullers are carefully scraped and the amalgam taken to a small iron clean-up pan, where it is thoroughly washed and freed from impurities and then placed in the strainers. The amalgam, when a sufficient amount has accumulated, is carried to the retorts. These are long iron cylinders set in brick work, and are capable of holding a charge of 1,000 to 1,500 pounds of amalgam. The charge being introduced, the fronts are securely fastened and luted, and fire kindled under the retorts. The firing is continued until the mercury is driven out. One-seventh by weight of the amalgam is about the amount of silver produced, or 2½ ounces avoirdupois to one pound of clean amalgam. The vaporized mercury passes off through a pipe in the rear of the furnace, and being cooled and condensed by means of flowing water, falls into a tank of water, and from this is drawn off and flows along iron pipes to the rams, where it unites with the mercury from the strainers. From this it will be seen that the loss of mercury in amalgamating is chiefly mechanical. After retorting, the spongy silver is then broken up and smelted. A little borax is added for fluxing.

"The bars produced are of an average weight of 1,200 ounces avoirdupois, and of an average fineness of 960. The tailings are conveyed from the tailing tank by means of an elevator to the agitator on a platform on a level with the pans. In this agitator, which is a circular tank 8 feet in diameter, the tailings are thoroughly stirred to bring into suspension all heavy particles remaining in them. From here they flow into two concentrators known as Frue vanners, which consist of long, endless rubber aprons, slightly inclined, and having a slow motion up the incline. A side-shaking motion is also connected to the apron, having 200 strokes to the minute. By the aid of these motions and a constant flow of fresh water over the apron, the heavy portions of metal are saved and the waste sand washes off. The concentrates are then taken to the smelting furnace and run with high-grade ore."

The McGregor mine is owned by McGregor Bros., and contains ore similar to that in the Naiad Queen.

The Commercial, owned by Smith & Tower, is an extension of the McGregor.

The Florence, owned by Knight, McLean & Co., has a shaft 200 feet deep, with 100 feet of drifts, and is showing up some remarkably fine silver ore. The formation is similar to that of the Naiad Queen.

The mines are improving as work continues, and these properties are some of the best and most reliable in the camp.

The production of Georgetown district for 1882 was $287,898 in silver.

Lone Mountain district is situated about 8 miles southeast of Silver City, and is one of the oldest camps in Grant County. This district has produced bullion in considerable quantities since 1872, but of late mining is less active there than formerly, owing, perhaps, to the greater attractions offered by some of the other districts. The ores are chiefly chloride and sulphide of silver and very rich. The veins are regular, but usually small. The formation is porphyry, limestone, and slate. The oldest and most experienced miners claim the veins to be true fissures.

The Victoria, Walter, and New York are owned by Mr. J. T. Campbell.

The Victoria is opened by two shafts of 40 and 20 feet depth respectively, sunk upon a 3-foot vein with well-defined lime walls. The ore by mill run yields $160 per ton.

The Walter is a contact between lime and porphyry.

About a mile south of the town is a group of mines owned by Mr. F. Bisby, comprising the Monarch, Virginia, Little George, and Allen. They all contain high-grade silver ore, some of which has been worked at Silver City.

The Eva and Sublime are two mines upon which considerable development work has been done. The Sublime shows a vein nearly 8 feet in width.

The Wabonsa, Antioch, Star, and Plutus are owned by Denver parties.

The Star is opened by two tunnels showing a vein averaging about 5 feet in width. The ore by smelting yields nearly 150 ounces to the ton.

The other mines of this group are of like character, but have not been as extensively developed.

The Burro Mountains, southwest of Silver City, contain rich and valuable mines yielding both copper and silver. Oak Grove, Paschal, Bullard's Peak, and Cow Springs are the chief districts.

Oak Grove district is some 12 miles from Silver City; and is one of the newest camps of the county. The chief operations are by the Queen City Mining and Smelting Company, which owns the Mary and the Burro Chief group; the latter comprises the Burro Chief, Ajax, Colorado, Malachite, Accident, Bonanza Queen, Bonanza King, and Copper Gulf, and constitutes one of the finest group of mines in the district. They are located in the eastern foot-hills of the Burro Mountains, in the midst of a heavily timbered region, with an inexhaustible supply of water, and have an excellent road from the mines to the smelter.

The Burro Chief has been developed to a greater extent than any other of that group. The work so far consists of three shafts, the deepest, 80 feet, showing a vein of clear ore from 4 to 5 feet thick; and the other two shafts have each attained a depth of 20 feet on the same lode, with 4 feet of mineral in the bottom. A tunnel of 40 feet has been driven, at which distance the hanging wall was encountered, cutting several strata of mineral from 1 to 2 feet wide, and all pitching toward the hanging wall. Another ledge is also included within the boundaries of this mine, and the work performed upon the same consists of two shafts and an open cut along and on the lode, each exposing a well-defined ledge of fluor-spar and copper glance, and is very valuable for fluxing purposes, as well as for the copper it contains. A tunnel is being run to tap this vein at 200 feet from the surface.

The work done on the other mines belonging to the Burro Chief group is little more than that required by the United States Government, though ample to expose veins rich in copper ore. The veins of these mines are composed of silicates and the green and blue carbonates of copper, intermixed with red and black oxides, with some copper glance.

The Lone Star and Mamma mines are located on Walnut Creek, about 2½ miles from Oak Grove in a southerly direction, and are classed with the best prospects in the Burros. The shaft being sunk on the line of the two claims is down 35 feet, with two walls, a pay streak 3 feet wide, which will run from 100 to 600 ounces in silver, and 40 per cent. copper.

Paschal district is about 5 miles from Oak Grove and 17 miles southwest from Silver City. The mines of this section occur in porphyry, and the ores are chiefly copper carbonates with some very rich oxides and sulphides of copper.

The principal mines are owned by the Valverde Company, and are located about a mile east of Paschal. The best-developed are the Saint Louis, Pittsburgh, and Colwell.

The Saint Louis has an incline shaft 220 feet in depth, with levels at 37, 66, 100, and 150 feet. Several hundred feet of drifting has been done, considerable cross-cutting and stoping, while a winze may be found here and there connecting the different levels. Altogether the mine is in fine condition, well timbered, and at the bottom of the shaft the vein is vertical. There is a large amount of ore on the dump and also in sight in the mine, the vein varying from 1 to 12 feet in width. The ore is red and black oxide and carbonate of copper, with sufficient iron for economical treatment. The ore is considered of good quality, some mill runs showing 22 per cent.

The Pittsburgh is an extension of the Saint Louis, being upon the same vein. It has been quite largely developed, but not to the same extent as the Saint Louis. So far as opened, it is showing the same both in quantity and character of ore.

These properties are being rapidly developed, and give promise of becoming valuable mines.

The Solid Lode mine, an extension of the Saint Louis, and located at the west side of the gulch from where the incline was started on the Saint Louis, is being opened with push and energy. The tunnel being run on this claim is in over 250 feet, crossing several extremely rich veins of mineral. At 150 feet cross-cuts have been run, showing some of the finest minerals yet extracted in this camp. A winze 7 by 8, all in ore, has been started at 165 feet.

The Colwell, near Sewall Springs, is making a very fine showing for the limited amount of work being done upon it, paying a net profit of $2,000 per month from the work of only four men.

The Boston Syndicate own the Copper Mountain, Southwest, and Sweet William mines.

On the Copper Mountain there are 720 feet of tunneling which shows ore the entire distance, while at 175 feet a rich vein was encountered. The ore in the tunnel runs from 5 to 8 per cent. copper, while that in the vein referred to runs from 25 to 40. In addition several prospect shafts have been opened which all show fine ore.

The Southwest is an extension of the Copper Mountain lode. This property has been partially developed by an open cut 25 feet in length and a shaft 25 feet in depth sunk in this cut, showing some good mineral in the bottom of the shaft and in the face of the cut.

Work on the Sweet William is going on with energy. The work consists of an incline, which is down 85 feet, and also an adit, 45 feet, both exposing large bodies of mineral. Nearly 120 tons of ore are on the dump, ready to be hauled to the smelter.

West of Paschal is a belt of mineral carrying rich silver ores.

The Clara Clarita is a contact vein between granite and porphyry, showing about 6 feet of ore in the shaft, which is 100 feet deep. This is quartz, carrying native and horn silver and black sulphurets, which assay from 30 to 600 ounces silver per ton.

The Mountain Boy, about 4 miles west of Paschal, is rapidly proving one of the best mines in the Burros. At a depth of 48 feet it assays on an average of $185 to the ton. The extensions of this mine, the Crown Point and Stonewall Jackson, are also looking well.

The Bobtail and Belle of the West are being rapidly developed, and also the Florence and Brunswick, extensions of the first two named.

Bullard's Peak district is northwest of Paschal, and also in the Burro Mountains. My informant in this section, Mr. Bernard McDonald, states that the mines of this district are located on a system of true fissure veins, which traverse a formation of syenite considerably interlaced by pyritiferous porphyry dikes. The strike of the veins is a few degrees east of north and west of south, and their dip varies from the perpendicular to 30° to the northwest.

The veinstone is a mixture of quartz, calcite, and baryta, the quartz gaining preponderance as depth is attained, and the width of the veins varying from 1 to 10 feet, the richest lode not exceeding 2½ feet.

The principal company operating here is the Solid Silver Mining Company, which owns eight of the best-developed and most promising mines in the district, viz, the Black Hawk, Surprise, Silver Glance, Chicago, Little Rhody, Kent County, Extension, and Cornucopia. These claims cover an area of 4,000 feet in length along the course of the veins by 1,200 in width. The company was organized in August, 1882, under the laws of the Territory of New Mexico; Silver City, the county seat of Grant County, being the principal place of business.

Two well-defined fissure veins traverse the property from end to end, and have been developed to a depth of 100 feet by shafts and levels, which have shown the existence of three rich ore chutes, dipping slightly on the course of the veins to the north. Where these ore chutes crop to the surface the ledge is in places a mass of native silver and chloride, and the deeper workings show similar masses of argentite, at one point 8 inches on the foot wall being so pure and solid that it can be chiseled out and sawed into blocks.

There has been no ore shipped from this mine, the object of the company being to put enough in sight in the mine and on the dumps to warrant the erection of machinery on the ground, of the proper capacity for the treatment of the ores.

In connection with the property already mentioned the company owns twenty-five timber claims of 1,500 by 600 feet each, on which there is a forest of large pine trees, which can furnish an unlimited quantity of timber and lumber for years.

There are a great many other mines in the district on which very rich ore has been found, but they are mostly in the hands of the original locators, who have not the means to prosecute developments to any great extent.

In the southeastern part of the Burro Range of mountains is *Cow Spring district*. Mr. Louis Timmer, of Silver City, informs me that in this district there are no mines that have been sufficiently developed to rank as producing mines, although there are a number opened to an extent to warrant the erection of machinery.

The Marble Hill group comprises fourteen claims, which promise well, having heavy iron outcrops. The veins average 2½ feet in width at the surface.

Upon the Horn Silver and Silver Bullion a joint shaft has been sunk to a depth of 78 feet, from which 3,600 pounds of picked ore were shipped to the smelting works at Pueblo, Colo., and yielded at the rate of 462 ounces of silver to the ton.

The Lost mine and Silver Fox show equally good results for the development made. The camp is still in its infancy, but the character and permanency of the lodes will doubtless be well established by another year's work.

Given's Camp is in Walnut Valley, 3 miles southwest of Marble Hill. Here there are a group of well-defined mines; the ore is chloride chiefly, and yields by mill run 164 ounces silver per ton. The principal lodes are the Crown Point, Eighty, Uncle Sam, Peg Leg, and Osceola. The country rock is granite and porphyry.

The Crown Point has been opened by shaft 70 feet deep, and the Eighty mine also by shaft 45 feet.

The Iron Duke carries about 70 per cent. of iron, and the ore is being extracted for flux for smelters.

Cook's Peak district is situated near the eastern line of the county, 40 miles southeast from Silver City, 15 miles from Florida Station on the Atchison, Topeka and Santa Fé Railroad, and some 25 miles southwest from Lake Valley. The mines occur in dolomite, limestone, and quartzite. The lime is cut by strong dikes of trachyte, and the greatest mineralization occurs along the line of contact with the latter rock. The ores are almost entirely carbonate of lead with a little galena. The gangue is principally iron with some sparry and siliceous matter. While these ores are rather low grade in silver, they are extremely rich in lead in a form most cheaply and easily reduced, and, carrying as they do sufficient oxidized iron to smelt them without the addition of any flux, are desirable for smelting purposes.

The principal mines are the Montezuma, Silver Gulf, Cortez, Othello, Desdemona, Mountaineer, Enterprise, and Sunset.

Though there are many other promising claims, the Montezuma has the most development, showing about 1,000 tons of ore on the dump, and 2,000 tons in sight ready to hoist from the mine. It is in contemplation to bring this ore to Silver City for treatment to form the basis for a smelting enterprise on a large scale.

Mr. William H. Wray, my correspondent for the *Tres Hermanes district*, which is situated in the extreme southeastern portion of Grant County, about 25 miles south of Deming, the junction of the Southern Pacific, Atchison, Topeka and Santa Fé, and Silver City, Deming and Pacific Railroads, states that it covers an area of about 7 miles square, and comprises the whole of the Tres Hermanes Mountains. The ores of the district are principally carbonates, iron. and galena, carrying horn silver, and are of high grade.

The following are some of the best developed mines of the district: Cincinnati, Newport, Lucky Cuss, Astor, Village Smith, Contention, Chance, Hancock, Arabelle, Anne, Golden Rule, General Shields, Silver Bell, and Crockett.

The Cincinnati is regarded as the best developed and most prominent mining property in the district. It has three shafts from 25 to 130 feet in depth, with cross-cuts and drifts; the vein averages about 3 feet in width, and the assays run from 75 to 2,100 ounces per ton. Twenty tons of ore shipped from this mine to Pueblo, Colo., for treatment gave returns of $158 per ton. The owners of this property intend commencing active operations soon on an extensive scale.

The Newport is on the same vein as the former, and is the first extension east. It shows the same character of ore and about the same sized vein, which is developed by a shaft 100 feet in depth.

The Lucky Cuss is developed by a shaft 60 feet in depth, and shows a vein about 2 feet in width, carrying iron with galena and carbonates assaying 60 ounces per ton.

The Astor is a contact vein, and is opened by a shaft 25 feet in depth; it carries carbonates assaying 50 to 75 ounces to the ton.

The Village Smith also is a contact vein, and is opened by a shaft 30 feet in depth; its ores are iron, carrying carbonates assaying from 25 to 75 ounces.

The Contention is developed by a shaft 35 feet in depth and a tunnel 45 feet in length. The ore is low grade, but is found in large quantities. The owners of this property have a United States patent for their claim.

The Chance is in a porphyry formation and is developed by a shaft 30 feet in depth, and shows a vein about 2 feet in width, the ore assaying from 75 to 1,000 ounces.

The Hancock is developed by a shaft 75 feet in depth; shows a vein of iron, carrying galena, carbonate, and horn silver, about 2 feet in width.

There are a number of other claims which will be of equal importance to those mentioned, but the district lacks capital for a proper development.

Victoria district is about 3 miles south of Gage, a station on the Southern Pacific Railroad, 20 miles west of Deming.

This district has commenced to attract considerable attention. The formation of the country is granite, lime, and porphyry, and the ores are principally carbonate of lead. The principal mines are the Iron Side, Eighty-two, Montezuma, and Contention.

The Iron Side shows a body of carbonate of lead between lime and porphyry which is 40 feet in width. This ore runs 20 ounces in silver at the surface, and at the bottom of the 25-foot shaft 200 ounces silver and 40 per cent. lead.

The Eighty-two is an extension of the Iron Side, and shows about the same.

The Montezuma mine, with a shaft 40 feet in depth, has 2 to 3 feet of carbonate ore, which runs $400 in silver and about 40 per cent. lead.

The Contention is an extension of the Montezuma, and of like character.

The best properties have passed into the ownership of George Hearst and Haggin & Tevis, of San Francisco, and although the production of bullion has been small the camp has developed large bodies of carbonate ore, assaying from 50 to 500 ounces silver and $30 gold per ton, and 50 per cent. lead. The ore makes to the surface in strong veins, which have been developed in places to the depth of 170 feet. In the lower workings have been discovered immense caves filled with hard and sand carbonate ore.

Virginia district is in the southwestern part of the county on the Southern Pacific Railroad, and comprises the subdistricts of Shakespeare and Pyramid or Leitendorf. It covers nearly the entire area of Pyramid range, about 20 miles in length by 6 in width.

Of the mines at Shakespeare the Lake Valley Herald says:

"The Atwood vein is in no respect a blind lode. It projects through the apex of a considerable hill about half a mile southeast of Shakespeare, the vein matter standing 25 or 30 feet above ground. This is characteristic of veins of this district, all of which are clearly traceable upon surface, generally for miles in length.

"The Atwood Mining Company was incorporated over two years ago in New Haven, under Connecticut law, and was reorganized in October last. Its president is C. A. Trowbridge, of New York, and J. L. Mitchell, of New Haven, is treasurer; Capt. James S. Stevens, the superintendent.

"Work was commenced on mine January 16, 1882, and since that time a working shaft of large size has been sunk to a depth of 218 feet, and an air-shaft from an opening a little lower down on hill to a depth of 209 feet. Working shaft goes down under foot wall of vein with a slight inclination to west, wall as smooth as though plastered for entire depth. Levels have been established at depth of 70 feet, 140 feet, and 209 feet. Air-shaft goes down in a smaller vein about 30 feet away, two being separated by about 30 feet of talcose slate formation quite easily worked. At 70 feet a level cross-cut through main vein shows it to be 10 feet 8 inches in thickness; at 140 feet level it is 30 feet, and at 209 feet level, 26 feet 6 inches. South vein averages just about 10 feet all way down. At each level cross-cuts have been run through both veins and through intervening slate, and in some places veins have been explored for a short distance to determine the character of the ore.

"As the veins deepen quality of ore improves, while as between two the narrower vein shows the richer grade. At 140 feet level in main vein formation appears to be disintegrated, and entire face of the vein for its entire width can be broken out with a hand hammer. It affords some most beautiful cabinet specimens, abounding in crystallized formations of most brilliant colors. At this place assays show a value of from $20 to $70, and it will average fully $30 for the entire 30 feet. At same level in south vein 200 tons of ore were taken out which run $120 to ton. At 209 feet level the ore averages over $50 from wall to wall in main vein, and considerable more than that in smaller vein.

"Ore all way down yields copper, silver, and gold, running from 6 to 50 per cent. of former from 8 to 70 ounces of silver and from 4 to 24 dwts. of gold. It improves in all as it gains in depth and holds about same proportions.

"Pumps are now on way to remove water, and make it possible to sink 70 feet further. It is expected that ore will prove very much richer below water level, and, as it may change in character, the determination as to the machinery to be used for reduction has been deferred until that depth has been reached. A double hoisting engine is also on way from New York.

"Seven car-loads of ore shipped to Denver before present owners came into possession of it, were reported as yielding about $240 a car, after deducting all expenses. Other parties who claimed to have seen the returns state that net yield was more than $500 per ton.

"Two tons shipped to New York for trial were tested by a Howland concentrator, and yielded $40 per ton of copper and about the same in silver and gold. Captain Stevens was in New York at time of our visit.

"It is thought that company will be ready to put in reduction works, of whatever kind they may decide upon, by 1st of March next. There is no lack of means nor any lack of confidence. Mining has been admirably done throughout, and by that date several hundred tons will be on the dump ready for treatment, while any reasonable amount could be taken from the mine as fast as required.

"With 40 feet of mineral entire length of claim, averaging as high grade as we have noted, it is not presuming to predict that this company will be made happy by and by with some very fat dividends.

"Like most towns which are built in a country infested with Indians, as this has been in the not remote past, Shakespeare is built of adobe, as affording best means of defense as well as furnishing the greatest amount of comfort attainable in a frontier residence.

"It is not a large town, although it would seem to have elements about it to have made it so ere this. The Atwood mine, which we have described above, is in its outskirts; the Superior, which is noticed elsewhere, is but a mile away; the Jerry Boyle, an immense copper vein, immediately adjoins the Atwood; the Miner's Chest, less than 2 miles away, and upwards of a hundred other good claims in more or less advanced stages of development within a radius of less than 3 miles, are enough to furnish employment for thousands of miners. Not only in the number of claims but in the great diversity of ores is the camp fortunate. Copper ores may be said to be the prevailing ores, generally carrying both silver and gold, although other veins show excellent galena ores carrying largely of silver.

"Location of town is just in edge of foot-hills, about 3 miles from Lordsburg on Southern Pacific road, which is the competitor for the trade of the section.

"As the whole prosperity of town depends upon mining industry, and, indeed, as every citizen is more or less directly engaged in mining, we can do no better than to review briefly the condition of some of its principal mines outside the Atwood.

"The Superior mine belongs to the Superior Mining Company, an Evansville, Ind., company, of which W. F. Nesbitt is president, E. P. Houston, secretary, S. P. Gillette, treasurer, and Jas. E. Carroll, superintendent. The claim was located seven or eight years ago. It was purchased from the locator in 1879, and the company organized in March, 1881. It was worked balance of year and well into 1882. Shaft is nearly vertical, following the vein, which is 4 to 5 feet wide. It is copper ore, carrying gold and silver in a gangue of silica and iron. It smelts readily, averaging 17 per cent. copper, 25 ounces of silver, and $10 in gold to the ton. A tunnel, which strikes the shaft at 68 feet depth, has been run to and beyond it a distance of 250 feet. About 700 tons of ore have been taken from it, which is now being smelted at Shakespeare smelter. No stoping has yet been done, and at least 10,000 tons of ore are in sight. Mr. Carroll, who has had the working of the mine, has the fullest confidence in its future, but the other parties are averse to putting in the necessary capital to operate it.

"The Miser's Chest belongs to General John Boyle, Judge W. E. Pope, and D. C. Roberts. Work commenced on it in April, 1881, and 50 feet were sunk upon incline of vein which creeps out parallel with the mother vein a few feet distant. In September force was increased and eight men worked steadily upon it until October, 1882. Incline has been run down upon vein 115 feet. A working double-compartment shaft has been sunk and connection made with incline at 95 feet deep, and is well timbered, having a well-constructed whim upon it. Entire incline shaft is in vein, which averages 4½ feet wide. Near the surface the ore is copper pyrites, averaging $38.50 in value. Below, whole vein matter was worth working. Gangue matter is a white talc, ore a carbonate of copper carrying gold and silver. A little below 50 feet 12 tons of ore have been sold to Shakespeare smelter, they paying for 300 pounds of copper, 20 ounces of silver and 1 ounce of gold, a total of $97 per ton. No sorting was done. Arrangements have been made for a smelter to treat this ore, specially bullion to be sold to Chihuahua parties for shipment to Swansea. We visited mine, went through workings as described above, and were surprised that such a property, showing its long lines of croppings—5 distinct veins—upon the surface should have so long remained unoccupied and unproductive. Mother vein is very much wider at the surface than one which they are working. It has same general slope as other; it will be reached by shaft at something less than 200 feet, or can be reached at any point by a cross-cut of a few feet.

"Less than a mile a little south of east is the Jerry Boyle. It is located at junction of two great veins. For a distance of several hundred feet the vein matter at the surface is over 150 feet in width, and assays from it run from $40 to $260 to the ton. It belongs to a Saint Louis company, formerly the Shakespeare Mining and Smelting Company, recently organized as the Indus Company. General John Boyle and Messrs. Roberts and Woodworth are interested in the present company, and are now managing their affairs. When company was first organized the noted Colonel Boyle was the manager until his death. He expended upwards of $60,000 upon property, but with so little judgment that there was little to show for it. A number of shafts outside the vein matter, on both sides of it, were sunk, until water was reached, and were then abandoned, so that it is said, with the above expenditure and with a vein cropping 150 feet wide upon the surface, not a ton of ore has been taken out. Recently stockholders of the company, which owns thirteen claims in the vicinity, have raised a working capital of $50,000, and work will be prosecuted under the direction of practical and experienced miners.

"On the Orleans they have a 100-foot shaft, with a 15-foot cross-cut into a large vein of galena ore which assays from 50 to 150 ounces of silver.

"On the Natchez there is a shaft 120 feet all the way in ore which averages 40 ounces, and is believed to be a good smelting ore.

"The Saint Louis and Sir George are showing 3 to 4 feet galena veins.

"Work upon properties had only been in active progress about a month at the time of our visit, and had been largely directed to doing the assessment work on the different claims.

"That this company will be heard from in the near future as a bullion-producing company there can be little doubt.

"As stated at the outset, the whole district is a succession of rich mineral lodes, only needing experience and capital to yield enormous returns upon the investment. The few properties we have mentioned are by no means all upon which work has been done. They are the more prominent ones about which we have been able to gain information during our brief stay. The Ormus Company, who are working the Henrietta and others at Pyramid, have excellent properties in the vicinity of Shakespeare upon which some work is being done.

"The Goldsmith, near Shakespeare, is one of its properties. On this there is a shaft 70 feet deep, the ore yielding from 10 to 12 per cent. copper, 25 ounces of silver, and a half ounce gold. It is a broad ledge and a very promising property.

"In the same vicinity they also own the Richard, an extension of the Superior, the Alaska, and one-third of Bacchus and Cupid.

"The smelter, which was completed in February, 1882, was erected by the Shakespeare Consolidated Smelting Company. It was bought by A. M. Gmehling, H. W. Schmidt, and the Carroll brothers, some four months ago. About $18,000 were invested in the erection of the works. It commenced running in February, and in three weeks turned out two car loads of bullion which averaged 500½ ounces of silver and 8½ ounces of gold to the ton. The ores treated were from the Victoria and Last Chance mines.

"The second run was in June, ten days, resulting in one car load of bullion which yielded 465 ounces of silver and 8½ ounces in gold to the ton from the same mines.

"The third run was made in November—15 days—producing four car loads of bullion (60 tons) averaging 250 ounces of silver and one-half ounce of gold. The ore for this run was from the Florida and Last Chance.

"The fourth run was made in December—eight days—upon copper ore from the Superior mine. The result was 15 tons of 97 per cent. copper, 100 ounces of silver, and 3 ounces of gold, a total value of $450 a ton, together with 4 tons of copper matte, assaying 81 per cent., worth $243 per ton.

"At the time of our visit the smelter was ready to start the next day with quite a quantity of Superior copper on hand and 600 tons of galena ore, which would yield from 30 to 40 ounces per ton.

"The difficulty they have had to contend with is lack of ore. With millions of tons within 10 miles of them, it is difficult to obtain the comparatively small quantity necessary to keep the smelter running. Those who are getting it out in any quantity are proposing to erect their own reduction works, and have no ore to sell."

At *Pyramid* the principal developments are upon the Viola, Last Chance, Penelope, Clara Sutton, Cleveland, Josephine, and Henrietta.

The Viola has a prospect shaft down 120 feet, all in ore, and distant from the working shaft 175 feet. The latter shaft is 305 feet deep, double compartment, and thoroughly timbered. Levels have been run at the depth of 75, 150, 225, and 300 feet, and to lengths varying from 30 to 95 feet. These levels, especially the lower ones, are all run directly upon the ore veins, and in both directions from the shaft, the vein running northeast and southwest, and having an average width of over 6 feet of solid ore. The walls are remarkably well defined. The formation is syenite and porphyry. The ore averages 200 ounces of silver per ton. This mine was equipped with a single-drum steam hoist, but as its capacity was too light it was replaced by a double-drum hoist, with cages having patent safety clamps, and with much more than double the capacity of the one formerly used.

The mine is the property of the Pyramid Mining and Milling Company, which owns also the Penelope, an extension of the Last Chance. Five prospect shafts have been sunk, which are all in good ore. The company are erecting upon this mine a 20-stamp dry-crushing mill with a White & Howell roasting furnace of large capacity. Water for the mill will be supplied from a shaft on the Penelope mine, where they have a large-sized steam pump of the Knowles patent, with engine, boiler, &c., already in operation.

But little work was done upon the Last Chance mine, except to keep it clear of water. Negotiations for its purchase were pending and it remained idle. About 2,700 tons of ore are now on the dump and about 1,000 tons have been shipped. The grade is from 50 to 80 ounces, the richest ore having been extracted from the lower levels. The greatest depth is 176 feet. The vein varies in width on the 140-foot level from 2 to 15 feet, and has been drifted upon for a distance of 360 feet.

The Henrietta is owned by the Ormus Company, of New Orleans. A hoist has been erected upon the main shaft, and development work is rapidly progressing; a depth of 150 feet has been attained. The vein is over 4 feet in width, and the ore assays an average of nearly 200 ounces of silver per ton, and a fair percentage of copper. There is an abundance of water in this mine, enough in fact to supply extensive reduction works.

The Josephine has a shaft down 80 feet, showing from 18 inches to 3 feet of ore, running high in copper, and averaging 185 ounces of silver.

The lodes in this district have unusually bold outcrop, and the ore is of singularly high grade. The average of the entire camp, taking the mines one with another, will work from 60 to 75 ounces silver and some gold.

San Simon district is on the Southern Pacific Railroad, in the extreme western part of Grant County, adjoining Arizona.

Mr. P. J. Mitchell, my informant from this camp, writes that there are several mines of promise in the district, principal among which are the Thor, rented by J. S. Sherburn; the Wallace, owned by Governor Wallace and associates; the Johnny Bull, owned by W. H. Henry and associates; the Tecumseh, owned by Elliot & Wilson.

On the Thor is a shaft 180 feet in depth; drifts running northwest and southeast at 130 and 180 foot levels respectively. The mine is looking well, a good amount of ore upon the dump which runs from 30 to 60 per cent. of lead, and carries from $50 to $100 in silver per ton; this can only be made profitable by treatment in the near vicinity, which the company will undoubtedly prepare to do shortly.

Operations were begun on the Johnny Bull mine October 1, 1882, since which time there have been several open cuts run besides an amount of surface explorations and the sinking of a shaft 71 feet in depth; there have been shipped from this mine 20 tons of ore, 10 tons to Swansea, England, and 10 to New York; 500 tons are now on the dump, which will pay for treatment here as soon as Mr. Henry and associates shall have erected a smelter, which they contemplate doing at an early day. The ore is copper, carrying gold and silver; the vein is 20 feet in breadth, runs in copper from 18 to 35 per cent.; silver, $50 to $100; gold, $200 to $250 per ton. This mine is owned by W. H. Henry.

The South Virginia and Sterling Price mines are adjacent to and on the same vein as the Johnny Bull, and the ore is similar in almost every particular.

On the South Virginia is a shaft 50 feet in depth with a level 30 feet at the bottom of the same; there are perhaps 100 tons of ore on the dump.

On the Sterling Price is a tunnel 64 feet in length on the vein; considerable ore upon the dump and in the tunnel, of the same quality as the Johnny Bull. These two mines are owned by a New York company, of which W. H. Henry is treasurer.

From the Tecumseh mine at Granite Gap, 3 miles south of the Johnny Bull, a large amount of ore was shipped and smelted at Galeyville. No statistics in regard to the same. The developments on the mine are quite extensive and very highly spoken of. Elliot & Wilson are the owners.

Telegraph district is situated in the northwestern part of the county, about 2 miles west of the Gila River and 30 miles west of Silver City. The first locations were made a year ago. The formation is porphyry, granite, and quartzite, and the ores are sulphide and chloride in quartz. The principal mines are the Tecumseh, Avery, Clinton, B. F. Simpson, and Mother lode. The amount of development is yet limited, but enough has been done to show the existence of regular veins of good size carrying ore of very high grade. A car load recently shipped from the Tecumseh and Avery yielded nearly $300 per ton.

The Avery is a true fissure with perpendicular walls and yielding arge quantities of horn silver and black sulphurets; some of the ore will run $3 and $4 to the pound.

Evening Star is the first extension east of Avery, and carries precisely the same character of ore.

Mountaineer and Clinton are fine claims, full of horn silver and black sulphurets.

It is reported that in December a rich strike was made on the high ridge west of Fox's Gulch, northwest of Telegraph Hill. It is a large body of ore carrying horn silver, which assays from $3,000 up to double that amount. It is in close proximity to the Pemberton mine, owned by Messrs. J. J. Bell, S. L. Wright, and John M. Wright. In the same district a prospector by the name of June has also struck a vein of chlorides, carrying horn silver, and very rich.

Steeple Rock district is 15 miles west of the Gila River, and 45 miles west of Silver City. The country rock is porphyry, and the veins are very large and strong. The ores carry both gold and silver. The principal one of silver is a gray copper in this district, but silver also occurs with galena. The gold is partly free and partly in combination with pyrites. The croppings are bold and of great width, showing free gold.

The principal mine is the Carlisle, owned by the Carlisle Mining Company, and managed by William A. Farish, who is putting his mine in working condition, and will soon have completed a mill of large capacity, and improved pattern for the amalgamation and concentration of ores. The Carlisle is destined to be one of the great gold mines in the county, and others in the district may prove equally as good.

The production of Grant County in 1882 was $35,000 in gold and $425,000 in silver.

LINCOLN COUNTY.

In this county, the mining section of which is situated north of Doña Aña and east of Socorro Counties, lie the Gallinas, Jicarillas, Lone, Carizo, Patos, Ticson, Nogal, White, and Capitan ranges; also several smaller groups, together with some of the rich mineral districts of the Oscuras and San Andreas. In every one of these ranges rich mines have been discovered and a limited amount of prospecting done upon them, but the result is some of the finest mineral yet discovered in the Southwest. The Gallinas produce fine copper, galena, and silver ore; the Jicarillas, rich gold placers and lodes carrying gold; Lone and Baxter group, both gold and silver; the Carizo and Patos, coal; the Ticson, an enormous body of free-gold ore, while the Nogal, White Mountain, and Capitan ranges carry free gold, silver, and galena. Large deposits of copper ore are also found.

Mr. J. E. Sligh, of White Oaks, has furnished me with the principal part of the following information.

Gallinas district takes its name from the Gallina Mountains. These mountains are situated in the northwestern portion of the county. The area covered by them is about 15 by 30 miles, or 450 square miles. Timber of fine quality is abundant. Water is scarce. The altitude is about 8,000 feet above sea-level. A great number of mines producing copper and silver ore in varying quantities have been discovered and located. Only three, however, have attained much prominence.

These are the Red Cloud, owned by a company. The work done shows a 4-foot vein of quartz at a depth of 125 feet. Assays of the ore have ranged very high. No mill or smelter being near, a mill run has not been made.

The Tenderfoot, owned by H. I. Miller, formerly of Rochester, N. Y., has a shaft 175 feet in depth, which has brought to view a large body of copper and silver ore. The vein at that depth is 9 feet in width.

The next is the Grand View, which has not been developed to the extent of the others, but so far as it has been opened shows the same grade and kind of ore.

Smith & McIntyre have established a new mining camp in the Gallinas, about 3 miles northwest of Council Rock and one mile from Fisher & Blackington's mill. At present, in conjunction with C. B. Brown, they are developing the McIntyre lode. The shaft is 23 feet deep. The vein is rapidly improving. On the surface the vein matter was spar, but this has given place to a clear white quartz. Surface assays gave an average of 10 ounces silver, but at 20 feet the average has increased to 15 ounces. Nine other locations have been made in the vicinity.

Jicarilla district is situated 30 miles south of the Gallinas. The Jicarilla Mountains have been famous for the last hundred years as a rich placer district. Gold in paying quantities now exists in all the gulches. The great trouble with this district is the scarcity of water, the nearest spring of any size being 14 miles away. Quite a number of veins have been discovered, all of which show free gold. Probably the richest as well as largest so far discovered is the Saint Elmo. Only a small amount of work has been done on any of the veins, owing to scarcity of water.

Sixteen miles south of the Jicarillas is *White Oaks district.* This camp is a mining town of about 500 inhabitants, several business houses, a good school, and two weekly newspapers. The town is situated in a basin, and is surrounded by a cordon of mountains, which completely shuts off the view in every direction, except to the west, where a large cañon makes off to the plains below. To the south are the Patos and Carizo Mountains, underlying which are fine veins or seams of semi-bituminous coal. Messrs. Williams Brothers & Co. have driven a tunnel in on one vein 5 feet in width to a distance of 240 feet. The coal burns very freely to a white ash, leaving no clinkers or slag.

Mr. Cochran has opened a 6-foot vein of coal equally as good. The extent of the coal field in this section is about 35 miles in length by about 12 in width. On the north is Baxter Mountain, where the two Homestake mines are situated. The Homestake Company have been unfortunate the past year in building a new process mill, at a very considerable cost, which has proven an utter failure, and is in process of being replaced by a stamp mill. No product yet reported, beyond the results of a 5-ton run on gold shaft ores, which gave a clean-up of $746 per ton. The average of the mine is about $45 per ton. Their ore is rich in gold, but so far they have no means of milling it.

This company is just finishing a very important piece of work in the South Homestake mine. When they drive 3 feet further in the north tunnel, it will connect with shaft No. 2, at a depth of 120 feet. This tunnel is 460 feet in length, and furnishes 100 feet of stoping ground. The south tunnel is 160 feet, and leads to the rich chamber above, where the present rich high-grade ore is being taken. Including the two tunnels, 1,920 feet have been driven; including shafts 1, 2, and 3, 3,254 feet of shafting have been done. The mine should make a good output when the stamp mill is completed.

The Little Mac, owned by the White Oaks Consolidated Gold and Silver Mining Company, is idle, owing to difficulties arising among members of the company. A large amount of the ore has been milled by Leer & Co., but no definite statement as to the amount of bullion obtained can be had from the superintendent.

Nogal district comprises the north end of the White Mountains and the Ticson Mountains. On the latter, 20 miles south of White Oaks, is situated the Vera Cruz mine. The development on this mine consists of 300 feet of tunneling and two cross-cuts on the vein, which demonstrate the lode to be 63 feet wide between clear, well-defined walls. The whole vein matter mills $9.47 per ton. Three tests of 20 tons each have been made of average ore with the above result. Water and fuel are abundant, and during the coming spring the Vera Cruz Consolidated Mining Company contemplate the erection of a mill which will place the Vera Cruz upon the list of bullion producers.

In Nogal Cañon, White Mountains, is the Rock mine, recently purchased by Mr. Harrison, of Saint Louis. This mine is very rich in gold. A mill will be erected there at an early date.

West of Nogal Cañon are the Red Jim and Copperhead mines, producing ore which careful tests have demonstrated to have a value of 50 per cent. copper and $43 in silver.

Six miles west of these are the Cub Mountains, in which coal croppings occur. The coal vein at that point is 37 inches thick and of fine quality.

Adjoining Nogal district on the south is the *Rio Bonito district*, where a large number of mines have been located. The ore is of every variety, copper, silver, zinc, lead, nickel, and gold. Very little work has been done as yet, but, judging from the surface indications, this district will, at no distant day, become an important factor among the bullion producers of the world.

The production of the county in 1882 was $40,000 in gold and $25,000 in silver.

SAN MIGUEL COUNTY.

This county lies east of Santa Fé County, and, like the latter, possesses a large amount of mineral wealth. The mountains, however, are almost wholly unexplored, but so far as prospecting has gone the results are sufficient to show that by judicious investment and management the yield of precious metals would be considerable, within a comparatively short time.

Gold can be panned from the sands of any of the streams and arroyos running down from the mountains, but it has been within the last year only that attention has been paid to discovering and developing the lodes.

Gold and silver bearing veins have been discovered in the Tecolote Range of mountains west of the Tecolote River, and still further west, near the Santa Fé County line along the Pecos River.

Several mining districts have been organized, Mineral Hill, San Carlos, Sweepstakes, Blue Cañon, &c., and the prospectors and miners are sanguine.

Mineral Hill district is about 12 miles west of Las Vegas, with Mineral City as its central point. The ores carry gold and silver, and, although generally of low grade, are abundant. Among developments that have been made here may be mentioned that of the Silver Plume mine. The owners started in a drift on water level, drove the tunnel 160 feet, and are now sinking a shaft, with a large body of low-grade ore in sight, assaying from $30 to $50 to the ton. It is a true fissure vein.

There is an abundance of wood and water, but there are no milling facilities, and development work only is being done, awaiting the introduction of machinery for treating the ores. Good indications of mineral exist above and near the Las Vegas Hot Springs, Rincon del Tecolote, Sapello, and various points. Float native copper has not only been found in the mountains, but likewise down the Pecos as far as Santa Rosa, and also in the arroyos in the vicinity of Fort Bascom. So far as the mineral in San Miguel County is concerned it is a virgin field known to exist, but little prospected. But little attention was given to it previous to the advent of the railroad, a little over two years ago, as stock-raising, mercantile pursuits, and trade engrossed the whole attention of the people and were found sufficiently remunerative.

SANTA FÉ COUNTY.

This county, the smallest in New Mexico, is situated centrally in the northern portion of the Territory, and was the earliest settled of any part of the mining area of the United States, Santa Fé, the principal city, and capital of the Territory, having been founded by the Spaniards in the latter part of the sixteenth century.

About 20 miles southwest of the city is the *Cerillos district.* The lodes here occur usually at the junction of two dissimilar formations. The veins run northeast and southwest along the range of mountains that course parallel to Mount Baldy Range, and at a distance of about 12 miles to the west. The width of the veins varies from 5 to 20 feet, and descend on an incline or underlie eastwardly; in some places the pitch is greater than others, but the average is about 22½°. Their course and dip follow those of the strata by which they are bounded, lying between syenite below and porphyritic or talcose rock above. The ore-bodies here, as elsewhere, seem to occur outside of the vein proper, or in receptacles formed in the hanging wall, as is the case in the Franklin and Western mines, also in the Ruelina and Georgie mines.

The Marshall Bonanza has a shaft 195 feet in depth, 25 of which is below the water level, a drift at 165 feet, which extends to the north 262 feet, within 125 feet of the air-shaft, and a drift of 162 feet to the south. In the south drift the vein averages from 3½ to 4 feet in width of concentrating ore, which is being treated at the concentrator a short distance from the mine. In the north drifts the vein of solid mineral averages 4½ feet in width, while at one place, in breaking the wall for the purpose of putting in a stull, it was discovered that there was but 10 inches of rock between the vein which was being worked and another large body of mineral of unknown dimensions, but of at least 4 feet in width, as is shown by a cross-cut which has been started, and now extends that distance. The ore is galena, sulphides, bromides, hard and sand carbonates, &c., which runs from $104 to $170 to the ton in silver and gold, while in the north drift at 125 feet from the shaft they have encountered a 12-inch vein of antimonial silver, which runs from $200 to $400 to the ton.

The Aztec is opened by a 125-foot shaft, and shows a 5-foot vein with a pay streak 12 inches wide. For the purpose of further developing this vein, a tunnel has been driven 65 feet. The vein shows quartz, carbonates, chlorides, and brittle sulphurets, which give an average run of about $100 in silver and gold, while some have shown as high as $365 to the ton.

The Algeria has a shaft 48 feet, while a contract has been let on the property and it is to be sunk 100 feet deeper. This claim contains two veins of mineral, about 12 inches in width, of galena and sulphides, and, it is claimed, has shown some horn silver. It assays $147 in silver and gold.

On the California the croppings show a 7-foot vein of decomposed quartz with two well-defined walls, while the assays from the ore taken from the 25-foot shaft give $40 in gold to the ton.

The Saint Louis and New Mexico Mining Company own eleven claims, among which is the Garfield, which at 8 feet showed a vein of about 2 feet in width, and gives an average assay of $9 in silver and $65 in gold. The shaft is now 40 feet deep with a vein 4 feet 4 inches in width, and has gradually and regularly increased in size and quality, while the ore has changed to a very fine grade of rich argentiferous galena.

The Golden Eagle joins the Garfield on the east, is of the same character, and has a vein which has increased in width from 6 inches at the surface to 3 feet at a depth of 25 feet, the bottom of the present shaft.

The Painter Boy, northeast of the Golden Eagle, with a shaft 25 feet deep, shows a vein of 2 feet in width of fine mineral, which runs well in gold and is in the same part of the district as the Marshall Bonanza mine.

The Owasco, an old Spanish mine, is being worked by a tunnel run on the course of the vein, which shows 2½ feet of good ore and is increasing as the tunnel progresses.

The Thomas Allen has two veins upon the surface ground, one of which has been opened by a shaft 36 feet deep, and brings to view a 2½-foot vein, which runs $60 in silver and gold, while the other is shown in the shaft of the Friday, which joins the Allen on the south, and shows a large vein of $100 ore.

The Aphrodite is situated in the gold belt of the district and is developed by a 25-foot shaft, and shows a 6-foot vein of gold-bearing quartz running from $75 to $100 in gold to the ton, and from the loose formation of the quartz at this depth it will doubtless make a rich showing as the quartz becomes solid, which it promises at no great depth.

Other claims of this company are the Wickes, Ruggles, Ennie, and Blair.

The Grand Central Tunnel Company own the Grand Central tunnel site, situated upon the eastern slope of the Grand Central Mountain. The level of the tunnel is 780 feet below the summit of the mountain, and will intersect about twenty of the principal veins in this part of the district, as shown by locations and developments which have been made on the mountains and adjacent ground. The tunnel has been worked for a distance of 65 feet.

The Open Sesame, situated on the south slope of Grand Central Mountain, is being developed by a tunnel, and is showing a fine body of galena and copper ore.

The Sleeping Beauty, on the southwest slope, is showing up a fine body of argentiferous galena, with average value of $75 per ton. The ore runs high in lead and is gradually improving as depth is gained. The shaft is now down about 60 feet.

The Ironsides lies west of the Sleeping Beauty, and has a well-defined vein of galena.

The Bottom Dollar, in Hungry Gulch, is an old Spanish mine. The shaft has recently been put in shape, and it is the intention of the owners to work it extensively. It is now opened about 110 feet deep.

The Harvest King is on the same vein, and at a depth of 45 feet has a 3-foot vein which runs well in silver.

The Washoe lode, situated at the north end of Hungry Gulch, on a line with the Bottom Dollar mine, is one of the promising locations in the gulch. It has been developed by a shaft down 40 feet, on a well-defined fissure vein 4 feet in width, which is interspersed throughout the entire width with galena, copper, and chloride formation.

The Ruelina is an old Spanish mine, which has been developed by cleaning out the old shaft to a depth of 115 feet and running a drift 50 feet. It is now well timbered, and work will be resumed at once. It has a vein of carbonates varying from 14 to 26 inches, which gives an average run of $65, silver.

The Nick of Time is being thoroughly prospected. The shaft is now 275 feet, and is still going deeper, with a drift running north 187 feet, a cross-cut to the east of 106 feet, and will soon be run to the west, when it is believed the large vein shown in the Ruelina will be discovered, the shaft of this mine being but 200 feet north of the Ruelina shaft. This mine has employed eighteen men and taken out about 250 tons of $50 ore, leaving much in sight.

New Placers district.—Mr. R. W. Webb, of Golden, in this district, furnishes much of the following information.

This district is situated in the southwestern portion of the county, and embraces a scope of country 18 miles long by 10 wide, with Golden, its business center, distant from the city of Santa Fé 38 miles and from the Santa Fé Railroad 18 miles.

Within the limits of this district are the Ortiz, Tuerto, and a portion of the San Ysidro Mountains, all mineral bearing and rich in gold, silver, copper, iron, and coal, while the wash from the Ortiz and Tuerto Mountains, for miles in extent, is extraordinarily rich in placer gold.

Modern attention was first attracted to the richness of the wash from the Ortiz Mountains at their northern base in the year 1833, though evidences then existed to show that considerable work had previously been done in a crude way.

In 1834 a settlement was formed which was called Real de Dolores, but now more commonly referred to as the Old Placers. Extracting the gold from sand and gravel constituted, of course, the principal industry, and was performed by "panning" and "rocking," water being packed in kegs on burros two miles to the richer deposits, or the gravel being packed to the water. In the winter time, however, placer mining was busiest. Notwithstanding the disadvantages under which these gravel beds were thus worked, they are said to have yielded annually for several years from $400,000 to $500,000. A few rich lodes were then known in these mountains, but not worked extensively, owing to the want of machinery, &c.

Some of the richest gold ore from the Ortiz mine was subsequently treated profitably by means of arrastras, following which was a 15-stamp mill in 1868, and another, improved and enlarged in 1874, now idle.

In 1840 the discovery of placer gold was made at the northern base of the Tuerto Mountains, and reports of the fabulous richness of the find soon attracted large numbers of people, who established the town of Real de San Francisco on the New Placers, now known as Golden. For years these rich and extensive beds were worked in the same crude and hampered way as those of the Old Placers, scarcity of water being the great drawback.

The annual output is reported to have been in excess of $500,000. These placers, the wash from both the Ortiz and Tuerto Mountains, spread out on all sides for miles around, and reach a depth of from 10 to 100 feet. Some gulches or channels are, as a matter of course, richer than others, but it is scarcely possible to wash a pan of dirt taken from anywhere in this vicinity without getting a color of gold.

Numerous machines of various design, known as dry washers or dry amalgamators, have recently been tested here in an attempt to separate the gold from the sand and gravel of these placer beds, using little or no water, but so far such efforts have proven failures, and no practical output is looked for from the rich washes save by hydraulic sluicing.

The mountain ranges of this section all contain lodes of gold, silver, copper, and iron ores. The formation holding these minerals is lime and porphyry, the principal bodies being held in the contact.

The San Ysidro Range carries silver ores principally. In the Tuerto and Ortiz Ranges, however, copper, gold, and iron ore predominate.

One of the best developed and most promising properties in the San Ysidro Mountains is the Advance, which shows a 3-foot lode of high-grade silver ore—horn, chlorides, and bromides—assays from which have returned as high as 12,000 ounces, while a 5-ton mill-run of poorly assorted ore and gangue matter yielded over 200 ounces per ton.

On the same lode, in course of development and showing the same character of ore, are the Silver Star, Mammoth, American Eagle, Deboo, Johnston, and Talbott claims.

There are also in the San Ysidro Mountains several argentiferous galena lodes, low grade, more or less developed, but of not sufficient importance to merit special notice. Depth is required to test their value, though indications are very promising for the amount of work done.

In the Tuerto Mountains are several valuable lodes of gold and copper ores, silver appearing only in small quantities, with the exception of a few claims on the southwestern slope, notably the Lucky, Alamo, and Silver Cliff, which contain fair-sized bodies of argentiferous galena.

The principal lode of the western half of the Tuerto Mountains is an immense contact vein, between lime and porphyry, of copper and gold ores, though where development has penetrated to any considerable depth, say 500 feet, the copper ore closes the gold ore out, and the vein, 39 feet thick, is composed entirely of sulphides averaging about 18 per cent. copper.

There are located on this Mammoth lode the Poor Man, Smith, Big Copper, Mountain Belle, Bibo, Keystone, R. E. Lee, and other claims, on all of which more or less development work has been or is being done, especially the Smith, Big Copper, Keystone, and Lee. Upon opening this vein the gold ore, principally an iron oxide, averaging about $15 per ton, lies on top the copper ore—a carbonate yielding about 10 per cent. copper—and forms fully three-fourths of the lode matter; but, as stated above, the gold ore gradually gives way to the copper until it is entirely displaced by the sulphides. This vein can be traced for more than 2 miles, and around the mountain from east to west.

The Keystone and Lee mines cover this lode on the summit of the range, and the contact on the former claim has the appearance of being over 200 feet wide, as mineral in place is found for that distance across the vein. Several openings on the Keystone, some of considerable extent, show the same character of ore as in other parts of the lode, only in much larger bodies. About 400 tons of ore are now on the dumps of this mine.

The Big Copper and Smith mine, adjoining each other, have some 1,200 feet of tunnel, inclines, drifts, and cuts, which demonstrate it to be one of the largest copper properties in the Southwest, to say nothing of the rich chimney of gold ore extensively encountered in the first workings of the lode.

In the vicinity of this mother lode are numerous veins, probably stringers therefrom, some of considerable width and all rich in gold, not a few of which have been followed to a considerable depth, say 100 feet, but as a general rule with unsatisfactory results, though still further development might produce larger and richer bodies of ore.

Further to the east and south, in the Tuerto Range, are numerous valuable properties, notably the Gleason, Sheridan, Oro Cash, Great Fortune, Bonanza, Black Bird, San Francisco, and Tip Top. On the northwestern slope are the Black Hawk, Florence, Romero, Dowling, Columbus, Western View, Vegas, San José, Iowa, Old Timer, Jackson, and Little Jim. All partake of the same general character of ores—gold and copper—and some, though containing small veins, are very rich in gold.

Midway east and west of the Tuerto Range is situated the famous Delgado gold mine, which has been worked quite extensively for years, the ore being treated in arrastras. The amount of gold yielded by this property is not known, though it must be considerable. The vein is a contact from 2 to 3 feet thick, and is considered one of the most valuable properties in this section. The richest placers in the entire district lie below this lode and in the gulch which receives its wash from it. This mine is now tied up in litigation.

Further to the east are the Copper Tip, on which a 100-foot tunnel has been run this year, and Copper Knight, both showing well in copper carbonates; Pine Tree, Tennessee, Empire, Golden Gate, Million, Emerald, Morton, Effie, Jennie, Chief Justice, Old Tom, Fairmount, Black Prince, Grant, Fannie Vaughn, Gold Cup, Broad Gauge, Toledo, Narrow Gauge, Rebel Boy, Boston, Pacific, Bunker Hill, Little King, Decatur, Water Witch, Irene, Shoemaker, and others, all showing well in gold ores and some few in copper.

Considerable work has been done this year on nearly all of these properties; every claim upon which work has been done has improved under intelligent management.

As has been demonstrated by two or three mines at the east end, and in the vicinity of those last named, all that is necessary to make valuable properties of most of the locations is capital and intelligent labor.

The lodes vary in thickness from 6 inches to as many feet, but a lack of proper facilities for treating the ores, some of which are very refractory in milling, coupled with the impecuniousness of the average prospector, has retarded their proper development. Capital could here find most profitable investments, as an average value of nearly all the veins opened up will not fall short of $35 per ton in gold.

The best developed and most promising property on the east end at present is the Era Southwestern. During the year the vein on this claim was cut by running a drift from the bottom of a 100-foot shaft, and it now shows 9 feet of mineral between well-defined walls, making a gain in vein matter of 6 feet in sinking 60. The average value of the ore, an iron oxide and sulphide, is reported at $43.50. This property is now in the hands of a stock company, which will soon erect works for the handling and treating of ores. The Era Southwestern is surrounded by claims evidently as good, considering the amount of work done.

In the Ortiz Range, lying 4 miles to the north of the Tuerto Mountains, the lodes contain gold, copper, and iron ores, with occasional silver-bearing veins. Several properties in these mountains have been worked quite extensively of late and in years past, producing large sums of gold. Some of the most valuable gold-yielding lodes have, at a depth of 100 feet or more, changed to copper carbonates and sulphides, following the characteristics of several veins in the Tuerto Mountains already referred to, while other gold veins hold out and give evidence of permanency and great value.

The copper ores of this range under present development average from 20 to 30 per cent. copper, and lie in veins from 6 to 20 feet wide. Other well-defined lodes, from 2 to 5 feet wide, show more or less silver ores, principally galena, as in the Homestake and Emporia mines, on which considerable work has been done this year. Assays from these properties give 50 to 75 ounces silver and some gold per ton.

The principal mines on the northern slope of the Ortiz Mountains are the Clinton, Roberts, Arizona, Atlanta, Yankee Boy, Saint George, Hickory, Maggie Jane, Arbitrator, Maverick, Alpine, Burns, Black Prince, Little Hatchet, and a few others of less importance.

The Maverick has been developed by a 100-foot incline, which shows a vein of free-milling gold ore, 4 feet in width, with about 100 tons on the dump, running $20 in gold to the ton.

The Alpine, situated a short distance above the Maverick and adjoining it upon the east, is owned by Mr. P. Cullen. Two veins are being developed upon this property, one by a cut and tunnel which at the present time extends 40 feet and shows up a vein of free-milling gold ore 4 feet in width, while the other vein is exposed to view by a 25 and 75 foot shaft and a tunnel driven 100 feet. This shows a body of ore 12 feet in width, which assays in silver and gold, principally gold, $68 per ton.

The Burns joins the Alpine on the north, and with a cut and tunnel of 165 feet discovers a vein averaging from 12 to 15 feet, of the same character as the ore taken from the Alpine. This is an old Spanish mine in which the old shaft is still open to the depth of 100 feet.

On the Black Prince several cuts and shafts show a vein averaging from 8 to 10 feet in width of free milling decomposed gold quartz which mills from $25 to $30.

The Yankee Boy is on the southern slope of the Ortiz Mountains. It has been developed by a 20-foot cut and a shaft 35 feet in depth, and presents a 17-foot vein of gold-bearing iron and copper-stained quartz, of which one mill test of 200 pounds gave $63.

There are also in these mountains large bodies of specular, red and brown hematite, magnetic, spathic, and micaceous iron ores, while on the northwestern slope are immense veins of anthracite and semi-bituminous coal.

The gold, silver, and copper product of this district in 1882, by the San Pedro works, 30 ton smelters and 25-ton mill, will not fall short of $20,000 gold, $10,000 silver; copper, 150,000 pounds, of 95 per cent., and 250,000 pounds matte of 60 per cent. The copper output during 1881 was some 250,000 pounds of 95 per cent.

The county's production in 1882 was $25,000 gold and $15,000 silver.

SOCORRO COUNTY.

This county borders on Arizona, and is north of Grant and Doña Aña, and west of Lincoln County. Its numerous mountain ranges contain almost innumerable mineral-bearing lodes, and the wonderfully rich discoveries that have been made within the past two years are attracting universal attention, and drawing capital from the east and west with which to develop the mineral wealth and place the mines in the rank of bullion producers.

Socorro City is the county seat and the business center for upwards of forty-two mining districts scattered throughout the county.

Socorro district is located in the Socorro Mountains, 3 miles west of the city. The mountains extend north and south for a distance of 15 or 20 miles, Socorro City being east of the southern part of the range.

This district furnishes two classes of ores, free milling and smelting; the former consists of chloride of silver in a matrix of sulphate of baryta and calcite associated with carbonate of iron, and occasionally green carbonate of copper; the smelting ore is argentiferous galena with a gangue of spar and quartz.

The chief mines of Socorro district are the Torrence, Merritt, Morning Star, Reserve, Santa Teresa, Socorro Tunnel, and Iduvigen.

The Torrence mine comprises 1,500 feet along the Socorro contact, the development consisting of two inclines extending down the mineral vein to a depth of nearly 300 feet from outcrop, these drifts being about 150 feet apart and connected by a system of levels. The ore is heavy spar, and the mineral vein varies in thickness from 2 feet to near 20 feet, and the ore increases in richness from outcrop, where it carries less than 10 ounces of silver per ton, to lowest level, where the immense ore-bodies average about 100 ounces of silver per ton. The cost of mining, transporting 4 miles to mill (for which $2 per ton is allowed), and milling this ore is about $8 per ton, and the average yield of ore has been rather above 30 ounces of silver. When the richer ores of the lower levels of this mine come to be milled, the output of silver and the resulting margin of profit will be greatly increased. In addition to the free-milling ore found, the arsenate, vanadate, and chromate of lead are occasionally met with. The mine is equipped with a 10-stamp mill.

The property is owned by New York parties, and is under the efficient management of Mr. George Waller.

The Reserve mine is situated at the north end of the Torrence. The main shaft is about 180 feet in depth, showing a 4-foot vein. This mine, together with the Morning Star, is being developed under contract by Messrs. Vernon & Tracy.

The Ophir has had assessment work only, but at a depth of 14 feet there is a 3-foot vein, averaging about 20 ounces in silver per ton.

A rich strike was made in the Star of Hope mine, which is located near the summit of Socorro Mountains. Assays of the ore run as high as 2,237 ounces of silver and $19 in gold. The property belongs to Creeswell & Co.

Mills and smelters are required in Socorro district before there can be any great production of bullion. The quality of the ore will not admit of the expense necessary to the long transportation to the northern smelters, and while low-grade ore has been found in seemingly unlimited quantities, it has been impossible to do anything with it but pile it upon the dump.

The only reduction plants are the Torrence mill and the smelter of the Socorro Mining Company. The latter is situated near the Torrence mill on a branch of the Atchison, Topeka and Santa Fé road, one mile from Socorro. The structure, which is very complete and built in the most improved manner, is supplied with Cornish rolls, crushers, &c., two Baker's cupola 5-inch blowers, two water-jacket furnaces of the most improved pattern, extra power engine and boilers. The capacity is 50 tons in twenty-four hours.

Limitar district is about 8 miles north of Socorro district, and is situated on a continuation of the Socorro Range of mountains. The veins in these mountains are wide and plain. Large lodes of copper, galena, and black spar carrying silver exist.

In the Armijo lode the shaft is 15 feet deep and the vein 6 feet wide. The ore is a black spar, which gives an average assay of 28 ounces of silver to the ton.

The ledge of quartz in the Big Wonder is at least 25 feet wide, being filled with nodules of galena.

Magdalena district is situated in the Magdalena Mountains, about 30 miles west of Socorro City.

The Kelley mine is in what is known as Middle Camp, and is proving to be a valuable mine. The development consists of a main tunnel, which follows the foot wall; is now in over 200 feet. From the surface an air-shaft has been sunk, and connects with the tunnel at 160 feet from face. At this point a cross-cut has been driven to determine the width of vein; has been run 19 feet in ore, and no wall discovered. From the air-shaft a drift has been run in a distance of 60 feet, developing a mineral vein lying parallel with the main body, being of the same character of ore and found in the same quantities. At a point 140 feet from face of tunnel and 20 feet from cross-cut, an incline has been sunk on the hanging wall a distance of 70 feet. The ore-body is gradually improving in quality as depth is gained. The ore is low-grade sand carbonates, carrying some galena; is silver-bearing, running on an average about ten ounces to the ton, and from 50 to 60 per cent. lead, with a small showing of copper. The ore is low grade, but in almost unlimited quantities, and easily mined at a cost not to exceed $1 per ton. The mine is producing 35 tons per day, which is bought by the American Mining Company's smelter, directly on the dump of the mine. A good deal of it has been converted into bullion by the smelter. The development is being pushed vigorously and the work is being done in a practical and systematic manner, and when desired by the owners can be made to produce ore in sufficient quantities to run smelting works of many times the capacity of the present ones.

The Juanita, a south extension of the Kelley, with much less development, shows also a large body of lead carbonates. This lode is located and opened up at points for a distance of about 3 miles, invariably rewarding development by showing a good vein of ore near surface.

What is said of the Kelley is equally true of numerous other veins running along sides and top of the mountains. Though not what would be called rich ores in silver, they carry enough of it to make them very desirable, and their quality as a flux with which to handle richer but more refractory ores in the neighboring districts makes them indispensable for smelters erected in Southern New Mexico.

The Juanita Extended, Companion, Legal Tender, and Grand Tower are all good claims, and being patented. The latter was worked some ten years ago by a party of adventurous miners, and the ore smelted in rude adobe furnaces, and, after being taken to Saint Louis via the old Santa Fé trail, was sold simply as lead, no returns being made for the 10 to 30 ounces of silver per ton it carries.

The Hardscrabble, a contact between lime and granite, is reported to have a vein 75 feet in width; it is being steadily worked and with the most satisfactory results. Twenty-five tons of its ore were recently shipped to the Cerrillos smelter, and gave a return of 33 ounces silver per ton and 25 per cent. lead.

The Belcher is an extension of the Hardscrabble. It has been opened by a 30-foot shaft, and shows every indication of being the same as the former.

The Magdalena Mining Company have a 40-ton water-jacket smelter at South Camp. This company owns some valuable properties.

The Iron Mask contains exceedingly high-grade ore, as does also the Lungren, its extension.

The Great Western is another of their claims. With a shaft 50 feet in depth they have struck a body of carbonate ore, which assays 17 ounces silver and 62 per cent. lead. Work is progressing upon this property with a view of securing a large amount of ore. The company count the Josephine among their leases. This prospect is looking well, and in a 60-foot shaft shows 5 feet of quartz, which assays 50 ounces of silver.

The Victor, owned by the same parties, is one upon which a recent strike of carbonates has been made, showing 16 ounces silver and 50 per cent. lead in a 50-foot shaft. This property is to be actively worked for the purpose of taking out ore as fast as possible.

The Raven was recently purchased by this company to secure the large amount of iron it contained for fluxing. It has upon examination proved to be of value as a silver-producing property. It contains magnetic iron and hematite, the hematite carrying about 23 ounces silver, while the dump of waste carries about 35 ounces. The property promises to be one of the best mines in the district.

The Mountain Queen Mining Company own the Mountain Queen mine, in Hope Cañon, the ore from which assays 45 ounces to the ton, with a trace of gold. They own also the Zulu and Kansas. The former assays 19½ ounces silver and 42½ per cent. copper, and the latter lode assays 11 ounces silver and 73 per cent. lead.

The North and South Imperial have been developed by driving a tunnel on the line between the two properties 150 feet and by a shaft

120 feet. It shows galena, which runs $40, and at the bottom of the shaft gold ore.

In Ellis Cañon, the Ellis Mining Company is continuing work in the tunnel which is being run to cut the vein of the Kansas. They are 90 feet from the opening, and expect to intercept the vein within 4 feet. The shaft is 45 feet deep in a 9-foot vein of carbonate ore, which runs from 200 to 300 ounces in silver.

In *Water Cañon district*, in the northern part of the Magdalena Mountains, the First Swedish Mining Company own twenty claims in the South Branch of Water Cañon, the most prominent of which are Saint John, Arronstead, Black Rock, Shampoon, Jenny Lind, and North Star lodes. All show up well, and five others which are not developed are good prospects. The ore is smelting and free milling, carries silver in good quantity, as well as some gold, copper, and a large per cent. of lead. The veins, like all others in this district, have no equality, some being 1 foot while others are 50 feet in width. The development consists of shafts from 10 to 100 feet in depth, and tunnels and drifts on the veins.

The Saint John has a shaft down 100 feet, and a tunnel in 100 feet to cross-cut the vein. This will cut it at a depth of 100 feet. The width of the vein at 100 feet is 4 feet.

The Arronstead, one of the promising locations, is showing up well as development progresses. The shaft has gained no great depth as yet. At 1 foot the assay value was $13 per ton, at 3 feet $26, and at the present depth it shows a marked improvement.

The Jenny Lind is a southern extension of the Saint John. The shaft is down 35 feet. At that depth water was encountered, and work temporarily suspended.

The Las Vegas and Saint Louis Mining and Smelting Company have thirteen mining claims, the most important of which are the Nineveh Copper, Nineveh Gold, Star of the East, and Orphan Boy.

The Nineveh copper shaft is down 55 feet, on a vein of iron and copper ore 40 feet in width between well-defined walls. The assay value of the ore is, gold, $10; silver, 30 ounces, and copper, 20 per cent.

The Orphan Boy is a 35-foot vein of spar, carrying galena and about 46 ounces silver and 64 per cent. lead. No amount of development has been done on this lode. One shaft is down about 25 feet.

The Nineveh Gold has a width of 6 feet between walls; runs $20 per ton in gold. The ore is free milling and appears in a lime and porphyry formation.

The Star of the East is down 35 feet; has a pay streak of 1 foot, carbonates of silver, which runs 21 ounces per ton.

The Spring mine, at a depth of 27 feet, shows a well-defined vein of copper 3 feet wide. This lode has produced some very rich minerals, assaying as high as 300 ounces silver.

The Viola Featherson at a depth of 20 feet shows a 5-foot vein of copper and galena. The location of this claim and the body of mineral in sight make this a most desirable property.

The Juniper lode, owned by Northup & Browser, has a shaft of 13 feet, and shows a well-defined vein 3 feet in width, and has on the dump about 20 tons of good ore.

The Maggie Merchant, owned by W. H. Smyth, has a discovery shaft 13 feet, showing a 3-foot vein, assaying 87 to 100 ounces per ton, and $20 in gold and 8 per cent. copper; has 15 tons of ore on the dump. North of the shaft is an incline on the lode 13 feet. At the west of the incline it shows a 6-foot vein of ore which assays $70 to the ton.

On the Silver King there is an incline or tunnel of about 40 feet, showing a well-defined vein of galena assaying from 10 to 421 ounces in silver and 60 per cent. lead.

About 8 miles west of Magdalena district is *Pueblo district.*

The Mackey mine, about 2 miles west of Pueblo, shows a vein of red quartz and clay of about 3 feet wide. Of this width the quartz occupies one-half, and in it are found sulphides and native silver, while the clay contains silver chlorides in sheets between vertical bands of clay, the bands containing also chlorides through them. Six assays and a mill-run of first-class ore have been made with the following results: Assay No. 1, $180.88, red quartz; No. 2, $148.40, gray clay; No. 3, $180.88, gray clay; No. 4, $267.90, red quartz; No. 5, $146.72, red quartz; No. 6, $4,370.70, red quartz showing silver sulphides, chlorides and some native silver. Mill-run of both red quartz and clay gave $188.70. Leaving out the highest assay of $4,370.70, the other five show an average of $184.95⅔. The mine is easily worked on account of the clay pay streak, which yields easily to the miner's pick. There is a shaft 20 feet in depth on this claim, showing ore from the surface to the bottom.

The Carnero, in the northwestern part of the district, is owned by Brittenstein & Co. On this mine there is a 90-foot shaft and a 50-foot level run. There is at least an 8-foot vein of ore, 4 feet of which they are now cutting, and runs from 100 to 500 ounces to the ton.

West from Pueblo district is *Gallinas district*, about 40 miles from Socorro, and in the Gallinas Mountains. It includes a strip of country several miles wide and 15 miles long, which has been thoroughly prospected, staked off, and several properties have been discovered which have already shown up well.

The ore in this district is chlorides, quartz, and spar carrying gold and silver, all being free milling. The veins are true fissures, the average width being from 6 to 10 feet.

The Old Boss was one of the first discoveries in this district. Near the surface the ore was galena, but as depth was attained free-milling ore was found. The vein is from 4 to 7 feet in width and there are about 800 feet of development. The company is working the mine in a systematic manner and contemplate erecting a 10-stamp mill over the mine.

The owners of the Old Boss Extension are doing some work. The shaft at 35 feet is in the vein of white quartz, and is looking well.

The Emma, adjoining the Old Boss on the south, is now 25 feet deep. White & Davis are the owners. They are doing sufficient work in order to obtain a patent. The vein is large and well defined, the character of the ore being black spar, very similar to the mineral of the Old Boss vein.

The Cabinet is about 7 miles from the celebrated Old Boss. The mine was discovered and located by Captain Reed, of the Rio Grande Mining Company, and is one of the best properties owned by that corporation. They have 15 feet of mineral-bearing rock, running 40 per cent. galena and from 45 to 500 ounces in silver.

A few miles west of the southern part of the Magdalena Range is the northern end of the San Mateo Mountains, a range which extends southeast to within a few miles of Fort Craig, and south to the military post called Ojo Caliente, and to the Alamosa River, a distance of about 40 miles. A few locations have been made in this range, but it appears to be comparatively barren of well-mineralized ledges.

The Upham is a recent location, owned by Mr. A. Hogwell. The vein on the surface is at least 50 feet wide. The matrix is a quartz stained with red oxide of iron. An assay gives $10 in gold and 2 ounces of silver. The claim lies 20 miles from San Marcial.

Mogollon or *Cooney district* is situated on the northwestern slope of the Mogollon Range. Devil's Creek on the north, Cooney's Peak on the east, and Whitewater Creek on the south are limits of the district, which embraces an area of 100 square miles. It lies in the southwestern corner of Socorro County, 20 miles from the Arizona line and 15 from the Grant County line, and has the advantage of being contiguous to the most fertile and productive valley in the Southwest, that of the San Francisco.

Mr. D. J. M. A. Jewett, my correspondent in this district, states that but two mines were developed in 1882. The first, the famous Cooney mine, has been systematically developed since early in July. Thirteen hundred tons of ore have been placed on the dump, and levels opened which afford 300 feet of stoping ground. Development work has been held back, because the amount of ore in sight for the last three months of the year was as great as the facilities for treatment available could take care of for some years. A 5-stamp concentrating mill was erected 2 miles from the mine, at the mouth of Mineral Creek Cañon, and is nearly ready for operation. A mill of this size is entirely inadequate as an equipment, but, if successful, the company will at once proceed with the erection of a 20-stamp concentration mill. The Cooney ores concentrate by Frue vanners 1 ton of concentrates from 2.6 to 18 tons of ore. They are copper base, carrying silver and some gold, and will make concentrates of from $400 to $2,000 per ton. These shipped to reduction works, and sold, yield better profits than can be obtained in works erected near the mine, and within the limits of the means of ordinary corporations.

The Silver Bar No. 2 (the second extension north of the Cooney) has been vigorously developed since August last by the Silver Bar Mining Company of Saint Louis. This mine, though upon the same crevice with the Cooney, has mainly a distinct class of ores. The second level is driven between walls in the north end of the property to a perfectly solid formation. It is about 6 feet wide, and is free-milling gold quartz. Thirteen hundred feet southerly the same crevice and ores are exposed in the shaft. Level No. 3 was started from Mineral Creek end (south) of claim to serve as an outlet for all the levels in the mountain above. This will cross-cut the Bar lode at, say, 300 feet, and shortly after it has done so this mine will be in a condition to produce handsomely.

The Silver Twig and its extensions, with about 300 feet of work, exposes a lode 4 feet wide between porphyry and granite walls, of the same quality as the Cooney mine.

Copper Queen lode, with twelve locations thereon, has little work done, but shows mineralized white quartz carrying from 50 to 200 ounces silver, and a ledge between walls varying from 19 to 20 feet.

Copper King mine, with 100 feet of development, shows a 4-foot vein of ore with an average assay of 150 ounces silver and 12 per cent. copper.

Albatross, on same lode, with 200 feet, shows a body of solid gray copper, 3 feet wide, carrying 50 ounces silver.

Ocean Wave, with 100 feet work, shows 2 feet of very rich ore, carrying gold and silver.

The Blue Bird, with 75 feet of work, exposes a body of ore, 2 feet wide, which is being worked in a Mexican arrastra, saving $200 per ton in gold.

The Los Angelos, Buckhorn, Teneriffe, Old Maid, Matilda, and Silver Plume are promising prospects.

Mr. George S. Haskell, of Chloride, has furnished the following description of the chief mines of the Black Range of mountains, a section of country which is justly attracting much attention on account of the richness of its mineral deposits.

The Black Range is situated about 54 miles almost due west from Engle Station, on the main line of the Atchison, Topeka and Santa Fé Railroad. The length of the range proper is about 100 miles, and the mineral belt can be traced for 80 miles by about 30 miles in width. It is divided into seven districts, commencing on the north, viz: Black Range, Apache, Cuchillo Negro, Limestone, Polomas, Perche, and Lake Valley districts. The Cuchillo Negro and Limestone districts are not on the main belt; they form a spur of the range. Apache district has four towns, viz, Chloride, Farview, Roundyville, and Robinson. Black Range district has two, viz, Grafton and Saint Charles; Cuchillo Negro one, Edwards; Polomas district one, Hermosa; Perche district two, Kingston and Perche City; Lake Valley district three, Nutt, Daly, and Sierra City. The range embraces parts of three counties, viz, Socorro, Grant, and Doña Aña, in which three thousand claims are recorded. The line of the mineral is in a northwest and southeast direction through the high spurs of the range up to and even west of the Continental Divide.

The formation of the country is partly red, stratified quartzite, but principally a gray porphyry, capped and flanked in many places by a hard, fine-grained, crystalline limestone, forming ribs or dikes. Distorted and thrown from its natural horizontal bed by the erratic outpouring of porphyry, and subsequently highly crystallized by the metamorphic heat, it is throughout this belt in a very disturbed state, although in many places still retaining its natural stratification. Breaking through the porphyry, its limestone cap in contact with both, presents to the geologist a most remarkable series of true fissures filled with a quartz matrix. Their persistent structure and bold outcropping through the porphyry, through and across the stratified limestone cap, leaves very little doubt of their deep-seated nature. These veins vary from a few feet in width to over 40 feet of solid quartz, carrying rich pay-streaks from a few inches to over 6 feet of gray copper; copper glance highly argentiferous, with black sulphurets, chlorides, and native silver and gold more or less disseminated through the mass. Besides these veins of rich ores, beds of red quartzite are met with richly impregnated with native carbonate, red oxide and black oxide of copper.

The range as far south as the Perche district is in the midst of a well wooded and watered country, abounding in limestone, iron, and lead ores, the bold outcroppings of which afford good tunnel entrances for economical and thorough exploration of their mineral character. New and rich discoveries are being constantly added to the number already made.

The amount of high and low grade ore now exposed on the dumps of the developed mines is sufficient to place these mineral deposits in the front rank of the mining districts of the world.

Black Range district commences about 8 miles north of Wild Horse Creek, and extends south to Bear Creek, being 20 miles in length by 15 in width. There are some six hundred recorded claims, those having the most development being as follows: Hiawatha, San Diego, Hawkeye, Iowa, Columbia, California, Grand Duke, Mammoth, and Delphi. These are improved by shafts ranging from 15 to 30 feet, the mines showing a width of from 2 to 6 feet and the mineral from a few inches to 2 feet, assays ranging from 30 to 500 ounces in silver and showing traces of gold.

The Occidental has a shaft 220 feet in depth, with several cross-cuts, showing fine mineral of black sulphurets and free gold. On this property there is being erected a 10-stamp mill, which will be ready to start about the middle of January on the ore taken from the mine, and will also do custom work. Everything bids fair for a successful run, and as this is the first undertaking of the kind in the range, it is expected that it will be kept running to its full capacity for many months, as the bulk of the ores of this district are free milling and carry a large percentage of gold. The Occidental, at the 170-foot level, has a 4-foot vein of mineral that will mill-run $52 gold and silver to the ton. A continuance of this will insure a handsome profit, as the works are extensive.

The Minnehaha and Great Republic are on the same lode, and show strong mineralized veins. The owners of these mines are awaiting the development of the Occidental. Mining cannot be conducted like any other business, and if the ore should fail entirely in one, the others are just as liable to strike a rich chimney in the ore that comes to the surface on these claims. Both are partially developed, and the showing is sufficient to warrant a continuance. Assays show gold and silver from $100 to $300 per ton.

Goodenough, Ontario, Homestake, and Shorty have shafts of different depths that show mineral of a paying character, and capital is required to develop and bring them into prominence as mines.

Montezuma and Alaska have shafts. The former is down 90 feet and shows some high-grade ore. The latter is down 180 feet, with 30 feet of drift, in which a stratum was struck, holding surface water, which compelled a suspension of work until machinery could be put in place to overcome the difficulty. This is now being done, and work will be resumed before the last of January. Assays from these ores run from $200 to $500 in gold and silver. These properties are owned by Chicago parties. The veins are large, cropping in places to a width of 18 feet.

Braxton, Buckeye, and Ivanhoe are situated on the main belt of mineral and developed by shafts.

The Braxton is down 100 feet and has a 20-inch streak of mineral, carrying free gold and black sulphurets, and assaying from $500 to $2,000.

The Buckeye has one shaft 85 feet and another 40 feet in depth, showing the same character of ore with similar assays.

The Ivanhoe has a shaft 470 feet in depth. When it had reached 85 feet, rich sulphurets and free gold were met with, and the prospects were so encouraging that the owners incorporated for $5,000,000, and put the stock on the market. This was disastrous, as they had not opened the property in a shape to warrant this capitalization. Work was continued in the primitive style, hoisting by hand, and the proper development thereby retarded, until the working capital was exhausted, since which time it has remained idle, to the detriment of the country. This is to be regretted, as the property is a good one. This, with the two former claims, have strongly mineralized veins, being between lime and porphyry. Professor Silliman, of Yale College, made assays of ore from the Ivanhoe lode from $200 to upwards of $60,000 in gold and silver. Some ore was shipped and worked. The quantity, the returns, and the place where reduced have not been made known.

Apache district.—The Buffum lode, situated on Dry Creek, 4 miles northwest of Chloride, has croppings, carrying free gold, in quartz.

The development is a shaft 180 feet in depth on a 4-foot vein, the mineral averaging about 13 inches. Several mill runs give returns of upwards of 100 ounces per ton. The ore is a copper glance with sulphurets and chlorides, and there are about 50 tons of ore on the dump. This is a strong vein and highly mineralized.

The Ready Relief, Buckeye, Ontario, Centennial, Belle, Solid, Dry Creek, and Mineral Creek are developed by shafts from 15 to 60 feet deep. All show the same strong mineralization of vein matter, the pay streaks varying from 8 inches to 2½ feet, with assays of from 40 to 300 ounces per ton. The mineral is a copper glance and gray copper, showing some native silver.

The Sailor Boy, situated near Mineral Creek, has a well-defined mineral vein. Considerable work has been done, but unfortunately it has been in the country rock, with a view to strike the ore-body at greater depth by cross-cuts. The ore obtained from the small stringers indicates a different character of mineral from that obtained from other claims in the vicinity. It is an argentiferous galena, carrying considerable copper and gold; assays give returns from $20 to $114 in silver and gold. The shaft is 175 feet in depth.

The Eureka and Miantonomoh are the property of the Ivanhoe Company. On the former is a shaft 100 feet, with cross-cut 50 feet in ore. The vein is 6 feet, with a mineral streak of 2 feet. Considerable ore has been shipped by the company to mill, returns of which have not been made known. Assays average 160 ounces. The ore is a copper glance. The latter claim has a shaft about 20 feet on the vein, showing good mineral.

The El Paso and San Antonio are situated a little north of the Dreadnaught. The croppings are very bold and show a strongly mineralized vein. The work done is a shaft 45 feet in depth on the former, showing mineral 2½ feet in width, which will assay from 190 to 350 ounces per ton. The latter has a shaft 15 feet deep in good ore 20 inches in width.

The Dreadnaught is developed by a shaft 35 feet in depth. The vein is 8 feet and the mineral 4 feet in width, and consists of gray copper and copper glance, assaying from 150 to 375 ounces in silver, and from 10 to 30 per cent. copper. Mill runs, 80 ounces of silver and 11½ per cent. copper. The walls are lime and porphyry, and here the Devonian lime comes to the surface, which is rarely seen in that position in this district.

The Silver Glance is situated south of the Dreadnaught; shows a strongly mineralized vein; has a shaft 40 feet deep, and assays 255 ounces in silver.

Mountain Chief is situated southwest of the Dreadnaught; shows a very strong vein, highly mineralized. There were forty assays of this ore made during the sinking of an 80-foot shaft, and the average was 643 ounces of silver with traces of gold. The vein is 3½ feet wide with a 20-inch streak of ore.

Silver Mountain is situated near the Continental Divide, at the head of Chloride Gulch; has a strong vein of mineral, and is developed by shaft and tunnel. The vein is 8 feet wide, with three streaks of ore that will average about 22 inches. The ore is bornite, assaying from 200 to 400 ounces in silver, and from 10 to 30 per cent. copper. Mill-run test, 140 ounces of silver and 18 per cent. of copper.

The Alta, Highland Mary, and Robby Burns are on Chloride Gulch, about 9 miles from Chloride, and show strong mineralized veins, developed by shaft 90 feet deep, and tunnel in 80 feet; assays from 90 to 130 ounces of silver, and 20 to 60 per cent. copper. The veins are from 4 to 6 feet wide, with from 18 inches to 3 feet of mineral.

Silver Belle, Commonwealth, and Ledger are situated south of Chloride Gulch, near South Fork, on a well-defined ledge of mineralized quartz; a shaft 60 feet in depth on the former shows a vein of ore about 2 feet wide, which will assay from 60 to 120 ounces silver.

Black Knight and Extenuate are situated at the top of the range at South Fork. They show a large outcropping vein, highly mineralized. The developments are a shaft and tunnel. The ore is about 10 inches, of a high grade, being a sulphuret; assays range from 640 to 900 ounces silver.

Wall Street and Wall Street No. 2 are situated 2½ miles due west from Chloride. The erosions have denuded the mineral veins, as they stand like walls of ore 30 to 60 feet in height. The development on No. 2 is a shaft 90 feet and tunnel 100 feet, besides other smaller shafts in different places on the ledge. The ore is a chloride, highly impregnated with sulphide of silver, this metal being found in the silicate of lime and porphyry, together with native and wire silver. The vein is from 3 to 4 feet and the ore from 8 to 22 inches in width.

Apache, Nane, Old Vic, Sunrise, Chieftain, Black Bear, Vulcan, Monte Christo, Hidden Treasure, New York, Central, and U. S. Treasury are on the same and parallel veins south of the Wall Street lodes. They are all more or less developed by shafts from 15 to 75 feet in depth, and show a similar character of high-grade ore, assays of which range from 40 to 400 ounces silver, and carry some gold.

White Signal has a shaft 75 feet, a tunnel 30 feet. The vein is 40 feet wide, and the mineral from 2 to 11 feet in width; assays from 80 to 500 ounces silver. Mill-run returns 60 ounces silver, 1½ ounces gold, and 6½ per cent. copper.

Grand Central, Hancock, Garfield, Hardscrabble, Prescott, Orwig, Buckskin, Dorsey, Morgan, Henry Clay, and Iowa are situated west and south of the White Signal, all showing strong veins of mineral with more or less ore on the dumps.

Colossal and Woods are situated a little south and east of Hagan's Peak, having a strong mineralized vein. The development is a shaft 100 feet, tunnel 80 feet, and a drift about 40 feet. Some 60 tons of this ore have been worked at Denver, with an average yield of $400 to the ton. The vein is 4 feet wide, mineral 20 inches to 2 feet in width. This ore is assorted and graded into three classes, the second and third remaining on the dumps, as there are no facilities for working it in the range.

Lying almost directly south of Hagan's Peak is the great Pye lode, on which are located thirteen claims, all more or less developed—Silver Prince, Queensburg, Lost Heir, Star Light, Highland Chief, Way Up, King No. 2, King, Tidal Wave, Midnight, Little Kate, Silver Plume, and Hamilton.

The King No. 2 and Way Up have a joint shaft 60 feet in depth in high-grade sulphuret ore, together with native and ruby silver; assay from 200 to 900 ounces in silver. Mill run, 142 ounces.

Highland Chief is a chloride ore, with sulphuret of silver, and assays from 200 to 1,000 ounces.

Queensburg and Silver Prince have considerable argentiferous galena on the surface.

Tidal Wave and Midnight are developed by a shaft, off the vein, which has been cross-cut at 50 and 85 feet, showing a good body of mineral that will mill-run 60 ounces silver.

The King is developed by shafts 175 feet deep, showing a pay streak that assays from 70 to 200 ounces in silver.

Hamilton lode has a tunnel 100 feet, with cross-cut 30 feet. This work was intended to be driven toward Hagan's Peak, one of the highest in the range, toward which the main veins seem to trend. The undertaking was premature, and is for the present abandoned, though if prosecuted it would probably result in the finding of veins of mineral.

Cuchillo Negro district has several hundred recorded claims, and lies to the east of the Black Range and Apache districts. This is a spur of the main range. The veins run in a northeast and southwest direction. The mineral of this section is argentiferous galena and the native oxides and carbonates of copper, carrying silver. The formation is of the same character as the main belt. The principal developed claims are the Black Knife, German, Rifle Shot, New York, Campbell, Storm, Picayune, Letter B, Evening, Saint Elmo, Star of Hope, Mexican, Moonshine, New Year, Ober, and Champion. The development work is shafts and tunnels, from 10 to 150 feet. Assays, as a general rule, are much lower than from those further west, but the ores are of a class that cannot be too highly estimated, as they form natural fluxes to the higher grades in the main belt. The company owning the Black Knife has erected a water-jacket smelter of ten tons capacity that is nearly completed, and when running will add greatly to the importance of the district. The Humboldt Mining Company of Philadelphia, Pa., own large interests in this district, and are pushing work vigorously. They employ a large number of men both here and in the San Andreas Mountains, having their offices and headquarters at Engle.

Polomas district is situated south of the Apache district, on the main belt of mineral, and has several hundred recorded claims, many of which are very promising for the amount of work done. The ore throughout this section is not so much exposed on the surface as in the Apache district, yet the veins are equally as strong and well defined; developments show the mineral to be high grade.

The Polomas Chief has several small cuts and shafts which would indicate a deposit of considerable extent. A tunnel has been commenced which has a breast of ore the full size of the work, and assays give returns of from 300 to 500 ounces of silver, and some gold.

Antelope is a recent discovery, and at the depth of 4 feet ore was struck that assays upwards of 640 ounces silver per ton; it is a black sulphuret. Arrangements have been concluded to sink 100 feet on the vein for an undivided one-half interest in the claim.

Hero, Hilda, Nourse, Massive, Hard Cash, Silver Brick, Ida, Iron Mask, and Summit have shafts of various depths from 15 feet upwards, and some of these claims show very fine carbonates that will assay from 18 to 50 ounces silver, but the developments are so meager that it is a hard matter to determine the size of the deposits except by the characteristic formation surrounding them, which indicates deep-seated mineralization.

Jessie, El Pastoria, Globe, Bath, Day Star, Monitor, Kentucky, Little Giant, and Columbia are somewhat developed, and show strong mineralized veins.

The other districts of the Black Range are alluded to under the headings of Grant and Doña Aña Counties.

The San Cristobal and Caballo Mountains are situated east of the Rio Grande, and are rapidly coming to the front with development. Before next spring that section will be shipping bullion, and stand prominent among the mining regions of New Mexico. The ore is not high grade, but it has a good average. Copper exists in sufficient quantities to return a handsome profit.

San Cristobal district comprises the mountains of the same name north of the Caballo Mountains. The Rio Grande River skirts the western base for about 10 miles, or throughout the entire length. The principal mineral belt lies on the western slope, and consists of a large contact vein between granite and limestone. The ore is principally copper glance and oxides, rich in silver, with some gold. The Jim Blaine, located on the vein, has a shaft down 140 feet. It has steadily improved with depth, and is now considered the best mine in the range. Other properties owned by the same company, the Ohio, of which Governor Foster, of Ohio, is president, show large bodies of good ore. Messrs. Rogers, Rowe & Co., and Chandler & Brothers, of Engle, own several promising claims that carry pay ore. Cutting this contact vein at nearly right angles are several apparently true fissures carrying galena. Near the south end of the mountains, on the west side, Messrs. Arnold, Dixon & Hope have opened a vein of very fine coking coal, about 5 feet in width.

South of the San Cristobal Mountains are the Caballo Mountains, which extend along the eastern bank of the Rio Grande River for a distance of about 20 miles. This range is narrow, being only from 5 to 6 miles across from east to west. The formation is very similar to that above described, the base on the western slope being a granite overlaid by a sedimentary rock, principally limestone, dipping to the east at an angle of about 10°. Beginning at the northern end, and extending for a distance of about 12 miles along the western slope, is probably the largest continuous copper vein in the county. It is also a contact vein, lying between the granite and Lower Silurian lime. The vein is plainly seen throughout its entire length by the croppings, which in many places stand from 20 to 100 feet above the country rock. The width is from 4 to 50 feet. About 40 claims, 600 by 1,500 feet each, have been located thereon, the majority of which are being developed by the owners, Arnold, Hopewell, and others. The ore is principally a red and black copper oxide, with carbonate and occasionally pyrites and copper glance. Cutting across this vein, and also found in the eastern slope, are apparently true fissure veins carrying with the copper some galena that assays from $25 to $50 a ton in silver.

Hillman, Anderson & Co. are pushing work on the Good Hope, which is a galena lode, running high in silver. They have five men at work on the Hard Case, which carries about 15 per cent. copper.

Peters & Smith have a 25-foot tunnel on the Philadelphia and are taking out good ore. They have reached a depth of 30 feet on the Silver Trail. It carries an 8-foot vein of galena which runs from 17 to 25 ounces silver.

The Humboldt Mining Company is developing a large number of its properties, and is now grading a site for a 30-ton smelter for the treatment of its ores. Large bodies of very fine iron hematite have been opened near the northern end of the mountains. Lime for flux is abundant.

The Little Burro and Oscuro Ranges, and the north end of the San Andreas Range, are situated in the southeastern part of Socorro County. They are included in what is known as the *Mound Springs district.* The mineral belt is quite extensive, possessing an area of about 40 miles square. This is comparatively a new district, the first locations having been made scarcely a year ago.

In the San Andreas much low-grade galena is found, yet some carrying as high as 20 ounces of silver to the ton. Assays on the surface show considerable argentiferous galena from 6 to 20 ounces to the ton. As yet little development has been made. A shaft at the depth of 50 feet shows a vein of galena and spar about 8 feet wide, and indicates much improvement in depth. There are large bodies of galena which might be worked profitably.

The San Andreas contains some rich copper carrying silver. A large vein of copper now owned by a Philadelphia company has been developed to a depth of 50 feet, and shows a vein from 6 to 8 feet. Assays have been obtained from this—copper, 60 per cent.; silver, 20 ounces.

The Little Burros show considerable copper, the carbonates, red and black oxides, with pyrites and copper glance, carrying wire gold and silver. Assays have been as follows: Copper, 60 per cent.; gold, 5 ounces; silver, 10 ounces. Considerable development is now being made. The veins are strong, large and in a granite formation.

The Oscuros are showing up considerable fine copper and silver. The veins are large and in a granite formation; considerable development is now being made. The Crœsus, Jessica, and Eliza have been developed to a depth of about 40 feet; all show carbonates of copper, red and black oxides, pyrites, and much copper glance. Assays have been obtained as follows: Copper, 65 per cent.; gold, one-half ounce; silver, 450 ounces.

This district has not yet produced bullion, but much fine ore is on the dump awaiting treatment.

In the northeastern part of the county, in the *Mattie district*, in the Chupadera Mountains, about 17 miles from Socorro, some gold-bearing iron and copper veins are beginning to show up well. The Kansas and Missouri Mining Company are developing several copper prospects. An assay from a new discovery gave 20 per cent. copper and 11 ounces of silver.

In the extreme northern part of the county a new mining district recently discovered in the Ladrone Mountains is attracting considerable attention and promises to develop into a prosperous mining section. The district is situated 35 miles north of Socorro and 12 miles from the town of Alamillo. It was discovered in April, and since that time development work has been done on several claims. Mill runs have given a return of $53. The ore is free milling, and is in well-defined fissure veins.

While Socorro County is a field of immense mineral resources, development has not kept pace with the discoveries of the precious metals. A number of causes have combined to prevent this. For years the country has not been free from Indian raids, and notwithstanding the fact that during the last two years the Indians have been kept in subjection, a general feeling of insecurity has prevailed from the knowledge that at almost any time a fresh outbreak might take place.

Another cause operating against successful development has been that a very considerable amount of valuable mineral land is owned either by corporations holding more than they can develop, or by individuals of too limited means to operate other than in a very small way. Transportation facilities have also been too limited to permit either the introduction of machinery on a sufficiently large scale, or the shipment of ores to northern and eastern smelters and reduction works.

The available means for reduction of ores in the county are as follows: Torrence Company, at Socorro, 10-stamp mill; Mogollon Company, at Alma, 5-stamp mill; Fulton Company, at Grafton, 5-stamp mill; Nulton Company, at Cuchillo Negro, 1-stack smelter; Magdalena Company, at

Magdalena, 1-stack smelter; Socorro Company, at Socorro, 2-stack smelter.

The production of bullion during 1882 was reported to me by Prof. Charles Langueman, of Socorro, to whom I am indebted for much valuable information, as follows:

Magdalena Company, 1,002 tons base bullion, at $106 per ton	$106,212
Torrence Company, silver bars	140,000
Socorro Company, 37 tons, base bullion, at $200 per ton	7,400
Alma arrastra (gold)	200
Total	253,812

In addition to this amount, about 1,000 tons of ore were shipped, varying in value from 8 to 700 ounces of silver per ton, the 8-ounce mineral carrying sufficient lead to pay the cost of transportation and leave a small margin for profit.

Professor Langueman furnishes the following list of minerals known to exist in the county:

Gold, in place and in placer; silver as native, ruby, telluric, brittle, antimonial, sulphuret, bismuthic, chloride, and bromic; copper in the form of green and blue carbonate, black and red oxide, native, chloride, silicate, sulphide, gray copper, and fossil copper.

Lead abounds as an arsenide, chromate, carbonate, molybdate, oxide, phosphate, selenide, vanadate, and sulphuret.

Iron is found as carbonate, chromate, columbate, hematitic, magnetic, silicate, spathic, specular, micaceous, sulphuret, titanic, tungstate, and various oxides, ocherous and red.

Coal usually occurs as semi-bituminous, although bituminous and lignite are found.

Fire-clay, porcelain, and potter's clay are found in small quantities, the former at Hansonburg and the latter in the Magdalena Mountains.

Arsenic, bismuth, sulphur, cobalt, and antimony are more or less abundant, and salt is to be had without mining in the beds of former lakes which occur in various sections.

The total production of Socorro County in 1882 was $10,000 gold and $430,000 silver.

TAOS COUNTY.

In this county the mining industry is still in its infancy. Considerable work has been done within the last year and new mines are discovered almost daily. From the formation of the country, the amount of placer deposits, and the quantity of rich float rock found, we may look for important developments when the country has been prospected more fully. Heretofore operations have been confined only to the foothills, but as they extend further and further into the mountains, reports of new discoveries and of extensive bodies of gold and silver bearing ores are continually made.

In *Picuris district*, in the southeastern part of the county, the ores are principally of copper, containing gold. Considerable development work has been done and there is a large amount of ore on the dumps, but as there is no machinery for its treatment in the camp, there has been no production of bullion, and the ore is not of sufficiently high grade to ship to the East.

The *Arroyo Hondo district* is north of Picuris, and about 15 miles from Taos. This district was organized in 1881, and since then upwards of five hundred locations have been made. Considerable work has been done in the way of development, but no machinery is on the ground for reduction of the ores.

The Dora Newell, owned by L. Staples & Co., has been opened by a shaft 100 feet deep, from which 8 tons of ore were extracted and shipped, which yielded at the rate of 140 ounces of silver per ton and contained 45 per cent. of lead.

The Arroyo Hondo Mining Company of Santa Fé, of which Governor Sheldon is president, have eleven claims, the most promising of which are the Bulwark, Alamitas, Sheldon, Venado, and Gray Eagle. These contain some large croppings, while the work of prospecting, now being vigorously prosecuted by shafts varying from 10 to 35 feet in depth, and tunnels driven in from 20 to 140 feet, shows veins from 6 inches to 6 feet wide, while the mineral veins in some instances are one foot in width. Most of the mineral thus far discovered is galena, carrying from $20 to $60 in silver and lead.

A few miles north of Arroyo Hondo is *Rio Cristobal district*, in which two hundred and fifty locations were made in 1882; none have been developed to a sufficient extent to rank as producing mines except one claim, owned by Washington parties, upon which a tunnel has been driven 215 feet and a shaft sunk 140 feet in depth. A large amount of ore is on the dump which will run about 75 ounces of silver to the ton, and also a little gold.

CHAPTER XI.

COLORADO.

The mountainous elevation and consequent rigorous climate of most of the mining regions in Colorado shorten in many of the mines the period for work. The late spring in 1882 delayed the commencement of actual mining and made the bullion output much less in the first than in the latter part of the year.

It has been claimed for Colorado that its bullion production for 1882 largely exceeded the production of the previous year, and the published returns from the smelting and refining works in the State would indicate an increase of about $3,000,000 over the former year. An examination of the shipments by railroads of ore and bullion, and the amount of gold and silver contained, will show that the increase is not so much owing to a larger production of the precious metals, but to a greater production of lead. The principal gain has been in Lake County, and in the San Juan region, the latter resulting both from the opening of new mines and improved facilities for shipping ore and bullion and obtaining supplies.

Production of smelters and refining works.—Many of the mills, smelters, and refining works have given out statements of their production, which have been published by the Colorado press. The following have been compiled from the papers in which they were published:

ARGO.

The Boston and Colorado Smelting Company's shipments for the year 1882 were as follows:

Locality.	Gold.	Silver.	Copper.	Total.
Gilpin County	$364, 000	$98, 000	$93, 000	$555, 000
Clear Creek County	26, 000	509, 000	23, 000	558, 000
Boulder County	140, 000	82, 000		222, 000
Lake County		336, 000		336, 000
Summit County		443, 000		443, 000
Park County	6, 000	96, 000		102, 000
Gunnison County		136, 000	3, 000	139, 000
Custer County	126, 000	93, 000		219, 000
San Juan County	4, 000	83, 000	8, 000	95, 000
Montana Territory	7, 000	538, 000	150, 000	704, 000
Utah Territory	12, 000	85, 000	84, 000	181, 000
Arizona Territory		16, 000	2, 000	18, 000
New Mexico Territory		59, 000	7, 000	66, 000
Other sources	2, 000	21, 000	7, 000	30, 000
Total	687, 000	2, 595, 000	386, 000	3, 668, 000

PUEBLO SMELTING COMPANY.

Production and business statistics for 1882 *of the Pueblo Smelting and Refining Company; A. W. Geist, vice-president and general manager.*

		Quantity.	Value.
Lead	pounds	25, 000, 000	$1, 250, 000
Copper	do	354, 000	63, 720
Silver	ounces	1, 425, 000	1, 603, 125
Gold	do	16, 000	362, 560
Total			3, 279, 405

GRANT'S SMELTING WORKS.

Locality.	Gold.	Silver.	Lead.	Total.
Arizona	....	$123,000	$3,000	$126,000
New Mexico	$20	10,000	600	10,620
Idaho	....	500	200	700
Clear Creek County	400	1,600	1,200	3,200
San Juan	4,000	17,200	6,100	27,300
Chaffee	200	4,000	2,500	6,200
Pitkin	....	2,200	1,700	3,900
Custer	18,300	5,600	400	24,300
Park	3,100	7,100	2,600	12,800
Summit	300	4,500	2,800	7,600
Ouray	800	12,300	2,500	15,600
Gilpin	....	3,500	300	3,800
Gunnison	....	900	300	1,200
Boulder	800	300	700	1,800
Lake	....	558,000	512,400	1,070,400
Other sources	1,500	16,000	4,300	21,800
Grand total	29,420	766,700	541,100	1,337,220

GOLDEN.

Gold	$154,733
Silver	497,275
Copper	45,632
Total	697,640

THE MOORE WORKS.

Gold	79,088
Silver	389,105
Copper	24,210
Total	492,403

LEADVILLE SMELTERS.

Gold	252,300
Silver	9,382,018
Lead	3,587,760
Total	13,222,078

LEADVILLE PLACERS.

Gold	60,000

BONANZA SMELTER.

Silver	10,080
Lead	5,400
Total	15,480

CAÑON SMELTER.

Silver	12,210
Lead	9,900
Total	22,110

SILVER CLIFF MILL.

Silver	30,000

RIO GRANDE MILLS.

Gold	310,000
Total value, gold, silver, lead, and copper	23,135,336
Deduct value of ores for the State	590,166
Bullion product of Colorado	22,544,170

The Mining Review publishes an estimate of the bullion production of the State, which, for 1882, it places at $23,766,000; contrasting 1881 and 1882, the Review says:

"The production of 1881 was about 77 per cent. silver, 14 gold, and 9 copper and lead. In 1882 the per cent. of gold has undoubtedly increased to 20 or more, with a like falling off in silver. Lake County shows a much greater increase over 1881 than that year did over 1880, and if any county in the State is greatly underestimated it is Lake, the banner mining county of the world. Clear Creek and Gilpin Counties have not materially varied, but have done what for years to come they will continue to do—produce their millions. Summit shows a falling off of more than one-half, not because less developed and good profitable mining has been done in the county than the previous year, but because the Robinson mine has lain idle the greater part of the time. Gunnison County will undoubtedly show a large increase, while Boulder has many mines producing, which were undeveloped a year ago. Custer has fallen off nearly one-half."

It makes the output by counties as follows:

Lake	$15,000,000
Clear Creek	2,010,000
Gilpin	2,006,000
Summit	1,000,000
Gunnison	800,000
Boulder	600,000
Custer	500,000
Park	400,000
Rio Grande	350,000
Ouray	250,000
Hinsdale	200,000
Chaffee	150,000
Dolores	140,000
Pitkin	130,000
San Juan	80,000
Saguache	50,000
Fremont	40,000
La Plata	25,000
Grand	20,000
Routt	15,000
Total	23,766,000

The Denver Republican published the following comparison of 1882 with 1881:

Mining product of Colorado for 1882, *by counties.*

Boulder	$550,000 00
Chaffee	225,500 00
Custer	705,116 00
Clear Creek	2,001,629 00
Dolores	125,000 00
Fremont	19,960 00
Gilpin	2,006,516 00
Grand	10,000 00
Gunnison	600,000 00
Hinsdale	275,000 00
Lake	17,131,853 00
La Plata and San Juan	675,000 00
Ouray	329,760 00
Park	283,564 00
Pitkin	100,000 00
Rio Grande	310,000 00
Routt	100,000 00
Saguache	52,000 00
Summit	1,150,000 00
Total	26,750,898 00

Mining product of Colorado for 1881, by counties.

Boulder	$535,482 88
Chaffee	196,400 00
Custer	755,600 00
Clear Creek	2,204,980 34
Dolores	125,000 00
Fremont	14,535 50
Gilpin	2,150,700 00
Grand	10,000 00
Gunnison	535,033 00
Hinsdale	187,375 00
Lake	12,738,902 00
La Plata and San Juan	40,000 00
Ouray	78,000 00
Park	350,000 00
Pitkin	120,000 00
Rio Grande	280,000 00
Saguache	53,500 00
Summit	1,828,000 00
Total	22,203,508 72

The Republican subtracts $1,000,000 from the total product of 1882, for ores received from other counties but credited to Lake County.

The Mining Gazette of January 5, 1883, estimates the bullion production of the smelters, mills, and placer mines in Colorado for 1882, to have been:

Gold	$1,935,000
Silver	14,695,298
Copper	519,562
Lead	5,393,310
Total	22,544,170

It claims that other mills and smelters will increase this amount to $23,000,000, and that ores to the value of about $3,500,000 were shipped for treatment by works outside of the State, making the total bullion production for 1882, $27,500,000.

The Gazette publishes the following estimated production by counties in 1881 and 1882:

BULLION PRODUCT.

The following table is approximately correct, but will have to be revised as more accurate data shall be received:

Counties.	1881.	1882.
Boulder	$535,482 88	$550,000
Chaffee	196,400 00	225,500
Custer	755,600 00	705,116
Clear Creek	2,204,980 34	2,001,629
Dolores	125,000 00	125,060
Fremont	14,535 50	25,000
Gilpin	2,150,700 00	2,006,516
Grand	10,000 00	10,000
Gunnison	535,033 00	600,000
Hinsdale	187,375 00	208,994
Lake	12,738,902 00	17,131,855
La Plata and San Juan	40,000 00	675,000
Ouray	78,000 00	329,760
Park	350,000 00	283,564
Pitkin	120,000 00	100,000
Rio Grande	280,000 00	310,000
Routt		100,000
Saguache	53,500 00	37,880
Summit	1,828,000 00	1,250,000
Total	22,203,508 72	26,550,812

Increasing the silver from its commercial to its coining value, and taking two-thirds as the proportionate value of the silver contained in ores shipped, would make the value of the silver produced in Colorado in 1882, $19,500,000.

This is evidently more than went from the State, and probably exceeds the silver actually produced in 1882 from Colorado bullion and ores, by at least $3,000,000.

Estimates and summary statements made up from local information in regard to the yield of mines and mills and smelters, and the shipments of ore are often unconsciously exaggerated; for while bullion mined in former years may properly be reported as part of the production of the current year, it frequently happens that the value of ores on the dump, or shipped away but not treated or reduced to silver bullion, is erroneously included in the statements of production, as though the silver contained had actually been extracted and placed upon the silver market.

Of the 90,000 tons of ore shipped in 1882 from Leadville, more than one-third, and perhaps two-thirds, was still in the hands of consignees or purchasers in the form of ore awaiting treatment.

The production of Lake County is claimed by the mining journals to have increased in 1882 $4,000,000 over that of 1881, but the gain in the precious metals was but little over $1,200,000. The Leadville smelters produced and shipped during the year 48,024 tons of lead. Adding to this the lead contained in the ore shipped from Leadville and from other districts, increases the lead product of Colorado in 1882 probably to 75,000 tons, which, with the copper product, would give a value of $6,500,000. This subtracted from the total production as estimated by the mining journals of the State, which include the value of the base metals, leaves the gold and silver production for 1882, in round numbers, at $20,000,000. In this estimate the silver is taken at its market value, but if computed at its coining rate, would increase the value nearly two and a half millions.

My estimate of the production of Colorado during 1882 is $3,360,000 in gold and $16,500,000 in silver, at its coining rate, a total of $19,860,000. This estimate is based not only upon reports received from the mines in every district of the State, but also upon actual refinery returns from all the works in the East which treat Colorado ores and base bullion, and reports from bullion dealers who have sold the bullion received from the refineries to the Government or to manufacturers, or have exported it.

The following table shows the approximate production of each county. I have endeavored to eliminate the value of ores raised or shipped, but not reduced, and have disregarded the values of lead and copper.

County.	Gold.	Silver.	Total.
Boulder	$260,000	$310,000	$570,000
Chaffee	45,000	100,000	145,000
Clear Creek	220,000	1,680,000	1,900,000
Custer	200,000	300,000	500,000
Dolores	10,000	110,000	120,000
Fremont	....	20,000	20,000
Gilpin	1,600,000	260,000	1,860,000
Gunnison	100,000	500,000	600,000
Hinsdale	20,000	80,000	100,000
Lake	320,000	11,500,000	11,820,000
La Plata	10,000	30,000	40,000
Ouray	80,000	150,000	230,000
Park	100,000	250,000	350,000
Pitkin	90,000	30,000	120,000
Rio Grande	210,000	20,000	230,000

County.	Gold.	Silver.	Total.
Routt	$15, 000	....	$15, 000
Saguache	10, 000	$100, 000	110, 000
San Juan	10, 000	60, 000	70, 000
Summit	60, 000	1, 000, 000	1, 060, 000
Total	3, 360, 000	16, 500, 000	19, 860, 000

The collection of statistics concerning the mines of Colorado was assigned to Mr. H. Silver, assayer in charge of the Denver Mint, who gave special attention to the matter and procured very full returns from all the sources of information at his command, which were classified and forwarded to my office, and with additional statistics and reports received directly from correspondents form the basis of the review of the mines of the State prepared in my office.

BOULDER COUNTY.

In the early history of Boulder County placer mining was exclusively conducted, but of late years the richer deposits in the lodes have claimed universal attention. The county is remarkable for its valuable belt of telluride ores, carrying gold and silver, which is found in the southern part of the county, and is 3 miles in width by about 13 in length.

Telluride ores are rare. Only twice before in the history of mining had they been encountered in any quantity, in the mountains of Transylvania and in Calaveras County, California, but in neither instance in such novelty and abundance as they exist in Boulder County.

The telluride belt, as at present known, extends in a northerly direction through Gold Hill, which is 5 miles from its southerly extremity.

The country rock, which at the northern part of the belt is a micaceous or gneissic schist, is in the remaining portion principally gneissic granite. All the lodes carry mineral of a similar character, but they may be divided into three classes, each distinguished by the kind of rock inclosing it. First, lodes in gneissic granite, embracing the richest and largest number of mines; second, lodes between granite and porphyry contacts; third, lodes in micaceous or gneissic schist, including the remaining veins, among which is the Smuggler, probably the largest telluride vein yet opened in the country.

Mr. John K. Hallowell, in a published geological monograph of Boulder County, gives the following description of the geological structure of the rocks of the county and origin of the mineral deposits they contain. Mr. Hallowell says:

"At a time when the system of elevations known as the Rocky Mountains had no existence, the space now occupied by them was an ocean of vast extent, but dotted here and there by islands of primitive granite, the earliest or oldest rock known. Around these islands sedimentary rocks were being formed which were of various thicknesses and extent, and which, afterwards, by pressure and heat, became metamorphosed. Such was the condition of the granite mountains, Gold Hill and Big Horn, just east of it, in the olden age. Boulder City to-day is but 10 or 12 miles east of them. This granite island shoaled off for 20 or 25 miles south. Both on the east and west sides of this primitive formation heavy beds of sedimentary rocks (afterwards metamorphic) were deposited, gradually filling the ocean bed to a level, when on the southern part of this island they overlaid it many feet in thickness.

But compared to the thickness of the strata built upon the sides of the granite, the overlying part was a mere shell. The metamorphic rock on the east side only came as far north as Boulder Creek. North of that, and east of the mountains named, there was none. As this ocean gradually shallowed, on the metamorphic rocks was deposited the sediment that afterwards made the Cretaceous rocks of the plains and foothills. At this place, or island, on the east side, a few hundred feet only of this age of sedimentary rocks were laid directly upon primitive granite; the other formations are entirely wanting. At this time we have a shallow, marshy sea, with granite islands showing a small distance above the water level. Abundance of vegetation in surrounding marshes, which afterwards made the lignite coal beds of the Cretaceous measures. That this condition of things continued for a long time, with some slight oscillations of level, is evidenced by the different beds and quantity of the coals. Finally came the contraction and wrinkling of the earth's crust, the result of which was the Rocky Mountain system, which, as it arose from the ocean depths, brought up as dry land the whole system of the plains from just west of the Missouri River, as well as the adjoining lands through to the Pacific Ocean.

"The force that elevated the mountain range carried the granite islands up also. In the movement large fissures opened in the granite, miles in length, and parallel with the longest axis of the island. The metamorphic rocks broke at their thinnest place, viz, just over the granite, and stand to-day uptilted upon each side of it. Those strata to the east dip towards the plains, those west toward the range proper.

"The different dips of these metamorphic rocks puzzled me for over a year, as when working in Clear Creek County in 1880 I noticed it and could get at no legitimate cause, although in South Clear Creek, a short distance above the forks, I could see where the strata broke, and at this place, on the north side of the creek, I found primitive granite outcropping with knife-blade streaks of tellurium ores. At that time I could not understand all of its significance, until a study of the foothills at Boulder City led me to connect the two points, and so solve the problem of the structure. At Clear Creek this split of the metamorphic rocks turned west a couple of miles, then southwest several miles.

"The bed of South Clear Creek occupies the chasm to the mouth of Chicago Creek, and this creek follows the rent in the metamorphic rocks almost to its source.

"Now this split and fissured granite held water like a sponge; the motion of the rocks gave great heat; the heated waters sought the surface through these fissures; at the surface the thermal waters rapidly evaporated leaving their solids in the fissures. Thus were formed the veins of this tellurium belt.

"Here occurs a beautiful illustration on a stupendous scale of the theory of mineralogists, that the contents of veins are derived from atoms carried in aqueous solutions from the surrounding country rocks; that the contents of the vein are thereby governed by the character of the country rock. Here in the primitive granite exclusively do we get the veins carrying the tellurium ores and the sulphides contained in the other veins. In the parallel metamorphic rocks between the tellurium belt and the range we get the veins with the ordinary sulphides, but no tellurium.

"At one place only are tellurides known where the outcrop is in recent formations, that is, in the Bassick mine of Custer County, Colorado. To my mind this indicates that the source of the ore supply extends down through all of the overlying rock, to a fissure in the underlying primitive rock. Consequently the deposit of ore in the Bassick will be found to be inexhaustible by any means known at this date that man can work with.

"There are more of these tellurium belts in Colorado; some of them, perhaps, as extensive and rich as the described veins of Boulder County, but nowhere so accessible and well proven."

The yield of Boulder County mines in gold and silver seems to have slightly increased in 1882 above their output in 1881, notwithstanding the fact that many of the old and heretofore well-paying mines, such as the Ni Wot, John Jay, and Melvina, have been shut down, while other well-known mines have not produced as largely as in previous years. Much of the work of the year has also been prosecuted in the development of the mines instead of the extraction of ore.

The Boulder News, in its summary of the county's yearly production, says:

"In looking over the list of mines from which ore has been sold at Boulder during 1882, there is a notable absence of well-known mines that have produced largely in the past and which yet may be productive, but which, if so, are shipped through channels to which we have not access. Notable among these are the Poorman at Caribou, the Cold Spring at Gold Hill, the Crater at Magnolia, and the property of the Scotch company at Albion. During the past year there have been some rich mines developed of which but little was before known. Among the number is the Senator Hill at Magnolia, the Ingram near Salina, the Golden King at Jamestown, and some others. The Caribou mine was not worked steadily during the whole year, and as a result its product of bullion is about $30,000 less than in 1881. The Golden Age free-gold mine has, however, given splendid returns and far surpassed any former year.

"Most of the high-grade ores of Boulder County find a market in this city at the Boston and Colorado and the Golden Company's works. The former company purchased during the year 1,480 tons, for which it paid $225,000; the latter purchased 680 tons, for which it paid $112,400, or in other words there were purchased in Boulder during the year 1882, 2,160 tons of ore, for which $337,400 were paid.

"From the above figures and such others as we have we can come very near the actual value in dollars and cents of the ore product of Boulder County for the year 1882. It is as follows:

" Caribou bricks, silver, shipped through express office at Boulder	$192,881
Ore purchased by the Boston and Colorado sampling works	225,000
Ore purchased by the Golden Company's works	112,400
Free gold produced by Golden Age mine	41,000
Gulch gold and small retorts shipped through banks	10,000
Ore purchased by Grant Smelting Works	1,800
Ore purchased by Mathews & Co., for Omaha works	1,000
Estimate of ore shipped to Black Hawk and Golden on which we have no figures	16,000
" Total	600,081 ",

Caribou district.—The Caribou Consolidated Mining Company, of New York, George Teale, superintendent, owns the mine of that name and the 15-stamp mill at Nederland, 4 miles distant. The mill has a capacity to crush 15 tons of rock per day. The mine is located upon a fissure vein of argentiferous galena and native and ruby silver. It is the largest and most productive mine in Boulder County, and has been the most extensively developed. Its shaft is down 1,000 feet, with levels at intervals of 60 feet from the surface, and cross-cuts have been extended 900 feet. The pay streak runs from 3 inches to 4 feet, and the mill run of the ore has averaged 52 ounces silver to the ton. The shaft, hoister, compressor, and roasting rooms are in one building, which is 50 by 160 feet. Its machinery is of the best character, with an 80 horse-power engine and a compressor of six-drill capacity.

The Santa La Saria, formerly the Blue Bird, at Nederland, owned and operated by Messrs. Van Buskirk, Marshall & Morton, has given employment during the season to from 20 to 40 men in pushing a tunnel and opening up the veins. The ores are sulphuret, gray copper, and brittle silver, and are claimed to average $98 mill run, although assays have run as high as 3,000 ounces of silver to the ton.

A short distance from the mouth of the tunnel a 10-stamp mill of 15 tons' daily capacity and a Howell roaster have been built. The mill is run by water or by steam power when the water fails.

The Poorman, of Caribou, one of the valuable mines of Boulder County, was the first discovery in 1869 of silver in the county, and created quite a boom for Caribou. A pocket was struck at 70 feet, which yielded $15,000 for its owner, Mr. Conger, who gave this discovery the name of Poorman, and $100,000 was taken out in opening the mine. The shaft has been sunk 370 feet, and four levels have been run, aggregating 1,000 feet. In sinking the last 40 feet $17,000 was taken out. The average mill run of the ore is said to be 300 ounces of silver to the ton. The increased production of the mine made the building of an addition to the shaft-house necessary. The present owner of the mine is Colin McKenzie, and M. D. McKenzie is manager.

The Grant County, an old location in the vicinity of Caribou, was worked about four months in 1882. It is said to have a fissure vein containing a variety of ore, silver glance, sulphurets, copper pyrites, galena, polybasite, and occasionally carbonate of copper.

The Silver Star is a recent discovery, upon which a shaft has been sunk 60 feet.

The Nautilus has been working a small force of men, extracting ore from a vein 6 to 10 inches in width, but said to yield, mill run, from 300 to 600 ounces of silver per ton.

The Garfield lode is described as another promising location, which has been but little developed. At 75 feet a body of mineral 4 feet in width is reported to run not less than $100 per ton.

Gold Hill district.—The Bella, near Gold Hill, owned by J. F. St. Clair, is a new mine opened since last July with flattering prospects. The mine is producing both gold and silver in the proportion of about 4 of gold to 1 of silver. The ore is sylvanite and tellurium.

The Fortune is on a vein containing silver, lead, zinc, and gray copper, with tellurium, but no work has been done upon the location beyond that necessary to hold the title.

In the neighborhood of Gold Hill is also the Mountain Chief, in which tunnels have been driven to develop unexplored portions of the mine. Little ore was sent to the mill, and to reduce the cost of transportation a crusher has been put up, in order that the ore may be sampled and the best selected and sent to market.

The Prussian mine worked a large force, and is stated to have produced last year more and richer ore than ever before in its history.

The Banner places its output in September at $18,713, and its product for October was estimated to equal that amount.

The Slide is one of the important mines of Gold Hill, and is claimed by some to be the great mine of the district. It has made regular shipments of ore which is free gold and tellurium, and some of its first-class assorted has yielded $3,000 per ton. The mine is down 625 feet, and at the bottom discloses mineral two and a half feet wide that mills $400 to the ton. There are seven levels from the main shaft, which at 552 feet is cut by the Corning tunnel, through which all the waste rock and water are carried off.

The Alamakee is worked through an adit upon the vein, and employed 6 men in drifting and stoping. The ore is said to be very rich, some of it running up into the thousands. The quantity of ore being taken out in August last was reported at 1,500 pounds per day.

The Horsfal, which had been idle and flooded with water, was sold early in the season to Messrs. Von Wendt & Crow for $52,000, who put on a force of 13 men. A rich strike of free gold was reported on the 170-foot level in streaks of pay ore from 6 to 12 inches wide, and at the end of the year a considerable quantity of concentrating ore had been accumulated for treatment at the mill at the foot of Gold Run, which had been constructed during the season, but was not then in running condition.

Magnolia district.—The Kekionga mine of Magnolia belongs to the Seely Mining Company of Colorado, and is worked by Messrs. Smith & Lonergan. It is on a fissure vein, as the lessees state, 52 feet between walls, containing tellurium ores carrying gold but little silver. The ores are shipped away for smelting or treatment. The shaft is down 150 feet, and levels have been run, one at 90 feet below the surface and the other at 140 feet. The upper is in fine ore from 2 to 6 feet in width, and the lower in pay ore 2 feet in thickness. A large quantity of ore was reported to be in the storehouse, although the concentrates were hauled to the mill for treatment, and considerable was shipped to Golden and the Argo works.

The Keystone was idle except for sixty days, during which time it shipped from 4 to 5 tons weekly. It is reported to have produced $250,000 in the previous nine years. Its shaft is down 270 feet. Two levels have been driven from the shaft, one 270 feet and the other 160 feet. The pay ore in the vein is from one-half to six inches wide.

The Telephone, near the Kekionga, is being developed by a tunnel, which is in about 100 feet. Mill tests are reported at from $80 to $125 gold per ton.

Little Dorritt, owned by the Magnolia Mining Company, has a ledge 3 feet in width, containing telluride ore in pay streaks from 6 to 12 inches in width. Its shaft is down 155 feet, and some mineral was shipped to the furnace, but the amount of yield has not been reported.

The American Eagle has been worked several years and paid moderately. It has been opened by several shafts, the deepest 100 feet. In a new shaft opened during the season some rich ore was taken out. The assay value of a shipment of 2,865 pounds of ore, the product of two men's labor in one month, was $507.40.

In the Hindoo Girl, a few yards distant from the American Eagle, and in the Rocky Mountain Mammoth claim, rich strikes are reported to have been made. A rich pocket was opened in the latter, 15 inches in width, containing free-gold ore, lumps of which are said to have assayed as high as 878 ounces of gold and 462 ounces of silver to the ton.

Sunshine district.—The El Dorado, owned by Messrs. W. H. Nicholson and Jacob Geyer, has a strong fissure vein 4 feet between walls, and pay streak from 6 to 18 inches thick. The ore contains tellurium, gold, and silver. It changed hands during the year and was worked only about two months.

The Inter-Ocean has been vigorously worked during the whole year and kept from 9 to 21 men employed. The mine was discovered in 1874. It has two shafts 52 feet apart, one down 120 and the other 75 feet. The shafts are connected and a drift has been run on the vein from the lower shafts 50 feet east and 35 feet west. The ore is telluride carrying black tellurium, sylvanite, and free gold. The gross earnings of the mine are stated by the Denver Mining Review to have amounted to $15,000, and it reports in April the value of six shipments of ore for test at the Argo works to have been $6,067.

The Saint George produced considerable ore, and several shipments are noticed by the local papers, but the value is not stated.

The Western Slope and Monongahela are mentioned as producing mines. The latter adjoins the Inter-Ocean and uncovered some high-grade tellurium ore which has paid well.

The Emancipation has been vigorously worked. New machinery has been put in, and a new shaft and ore house three times the size of the old one has been erected. At the bottom of the shaft, 210 feet deep, a body of high-grade tellurium ore was struck. A force of from 20 to 24 men in three eight-hour shifts have been employed in drifting from the 200-foot level and in continuing the working of the shaft.

The Napoleon, located 400 yards from the Emancipation, has obtained some mill runs from the ore taken from different parts of the mine which gave per ton from the tunnel in 24 feet, 10 ounces gold, 9 ounces silver; shaft down 15 feet, $98 gold; shaft down 45 feet, $213.64 gold.

At Sunny Side are located the Amsterdam and Atlantic.

Sugar Loaf district.—A few mines are worked in a small way, which produce both gold and silver in the following proportion: The New Enterprise, chiefly silver, but carrying 30 per cent. value gold; the Smoky Hill, Cyrus S. Robey, superintendent, a telluride vein, shaft 40 feet deep, one-quarter silver and three-fourths in gold; the Sugar Loaf, B. Bliss, agent, three-fifths silver and two-fifths gold.

The Pine Shade, owned by T. F. Herndershot & Co., has fine gold and tellurium ore which yields from 2½ to 36 ounces gold per ton. A shipment of ore yielding from first-class $609.78 and from second-class $104.46 to the ton is published in the Mining Record.

The Ives-Phillips Placer Company has washed out some gold near Boulder, and placer mining has been carried on in a small way in some other localities, and is still continued at Sugar Loaf, where Messrs. G. P. Wood and William Germain have taken out and sent by express considerable gold to the Denver Mint.

Crisman district.—At Crisman are the Yellow Pine, Gray Copper, and Vancluse, under the charge of G. R. Williamson.

The Yellow Pine is one of the celebrated silver mines of Boulder County. It worked, during a portion of the season, as high as 27 men. It is opened by several tunnels, the lowest containing the richest ore. The News and Courier states that the yield from 28.9 tons was $7,522.58, equal to $260 per ton.

The Gray Copper and Vancluse lie adjoining and almost at right angles to the Yellow Pine, and contain ore of similar character.

The Printer Boy, near Crisman, is worked by a tunnel (now) driven about 75 feet, and has been producing good ore, the poorest of which is reported to have run $140 to the ton.

The Vein and Moonstone, near Crisman, have produced a small amount.

At *Salina* the Baron lode was worked by Mr. Clem C. Eddy for about six weeks. Its ore is tellurium and free gold.

From the Baxter, the Ni Wot, and other producing mines, no information has been received.

The Ingraham mine is situated about half way between Sunshine and Salina. This property was worked for several years; lately a tunnel has been run, which intersects a vein 40 or 50 feet below the bottom of the main shaft and discloses a "pay streak" almost 8 inches wide, and nearly half of it being solid tellurium.

At Gold Cliff the Poor Man's Relief has been profitably worked by lessees for three years. Its ores, of which several shipments have been made, are sylvanite and tellurium, intermingled with free and rusty gold.

The Chatham mine, at Ward, is owned by John Rice, and reports a small production.

The following interesting review of the mines of Central district in the vicinity of Jamestown, prepared by Mr. George W. Rearden, mentions the most important mines of that district:

Central mining district is the largest and most northern in Boulder County. Within its boundaries are found nearly all the varieties of minerals known to mineralogy. It is accessible to Boulder, 13 miles distant, by good wagon-road.

Jamestown is the principal town of Central mining district, and is situated on James Creek. Here are located one concentrating mill, operating Frue vanners, two mills operating the Robinson process, each with a capacity of 24 tons per day, and the Crocker-process ore-reduction works.

There are also two free-gold mills: one, the Golden Age, operating 25 stamps; the other, the Pell, operating but 6 stamps.

The mines at this point vary in character, some being free gold, many others tellurium veins; also gray copper, argentiferous galena, native copper, and cinnabar. Prominent among these mines are the following:

The December mine, situated on Golden Age Mountain, just north of Jamestown, is owned by the December Mining and Milling Company, limited, of Philadelphia. The developments are three shafts, Nos. 1, 2, and 3. No. 1 is 100 feet in depth, with levels east and west at 50 and 100 feet, respectively. The 100-foot level, east 25 feet, shows a body of 4 feet of fine galena ore, together with a rich free-gold streak; throughout both levels the pay is well defined. Shaft No. 2 has reached a depth of 50 feet, at which point the galena streak is some 2 feet in width, giving returns of 71 ounces in silver and 25 per cent. of lead. Shaft No. 3 is 25 feet in depth, showing an average body of quartz as in the other workings. This property came into the possession of the company in the spring of 1882, and the work done on it has been solely in the development line, the ore being held in reserve.

The Colfax mine and 10-stamp mill is situated in Central Gulch, just below the December mine, and is owned by Gillette & Freeman. The character of the ore is free milling. The mine has been opened in several places along the vein by a number of shafts and 10-foot holes, one shaft being 85 feet in depth. It is a strong contact vein, lying between porphyry and granite walls, and has a crevice varying in width of from 2 to 12 feet, carrying free gold that mills from $10 to $30 per ton. There are now on the different dumps of this property about 200 tons of ore. The work done this year was the erection of the mill, which, since completion, has reduced about 100 tons of ore. The work on the property has consisted of about 100 feet of drifting.

The Princess, owned by Cavanagh, Ball & Decker, is a new discovery this year, situated in Central Gulch, which shows a fine body of galena, with a separate streak carrying leaf gold, the galena giving returns of 40 to 50 ounces silver and 60 per cent. of lead, while the gold streak returns some $800 per ton.

The Encounter, Hidden Treasure, Morning Glory, Buckeye, Volens, May Queen, and Cheap John are all free-gold lodes, situated in Central Gulch, and are all good, promising prospects.

The Pet mine, situated in the same gulch, is also free gold, and is developed with a shaft 40 feet in depth and width, several small openings along the vein showing a pay streak some 14 inches in width. This property is now being actively worked with very satisfactory results, some of the ore being marvelously rich. The Pet is owned by the Du Bois Brothers.

The Romance is situated near the Princess. The character of the ore is free gold, with a pay streak varying from 1½ to 3 feet in width. This property has furnished some of the rarest specimens of native gold taken from the ground in Colorado. Its development consists of a main shaft about 80 feet in depth, with several surface openings.

The Big Thing is situated on Little Jim Creek, just above Jamestown. The character of the ore is galena and iron, which gives returns of from 13 to 40 ounces of silver and 1½ ounces of gold, with 50 per cent. lead. The development consists of one main shaft about 100 feet in depth, with some drifting, all in mineral, the width of streak as yet being unknown. This property is now being actively worked under lease, daily shipments being made to the Omaha smelting works.

The Argo mine is situated about 200 yards north of the Big Thing, the character of the ore being the same, only of a higher grade. The development consists of a shaft 45 feet in depth and some small surface openings, which show a pay streak varying from 18 inches to 2 feet in width. Work has just been resumed on this property, the ore giving returns of from 22 to 84 ounces silver and 30 per cent. lead per ton.

In the immediate vicinity of the last two mentioned properties are the following prospects: The Elkhorn, Great Eastern, Evening Star, Monitor, Kalamazoo, and the Big Nancy, all in various stages of development of from 10 to 20 foot shafts, and from 10 to 40 feet of tunnels, the character of ore in all being galena, iron, and copper pyrites carrying silver and gold, with more or less copper.

The American is situated in Elkhorn Gulch, about 1 mile northwest of Jamestown, and is owned by George W. Rearden. The character of the ore is free gold. It has for development a tunnel 150 feet in length on the vein and 2 shafts, one 60 feet the other 50 feet in depth, all the workings showing good ore. The crevice varies from 5 to 8 feet in width, and carries a large body of free-gold ore, the first class assorted giving returns of from $100 to $320 per ton, the large body of second class giving from $20 to $40 per ton. This property, since its discovery, has produced about 200 tons of ore, which has left a handsome profit over and above all the expenses of development.

The Stanley and Mineral Point are both free-gold lodes situated in the immediate vicinity of the last-mentioned property, and are variously developed with shafts and tunnels. Both properties are now being worked with good results.

The La Loma, Potosi, Gold Dirt, Lady Temple, Nil Desperandum, Rattler, and the Blue Rock are also situated in the same vicinity, and are all promising free-gold prospects, and in various stages of development.

The Buena mine is situated on the divide between Little Jim and Big Jim Creeks, about one-half mile west of Jamestown, and is owned by the Buena Gold Mining Company of Philadelphia. The character of the ore in this property is telluride, showing sylvanite, calaverite, petzite, and rusty gold. It has for development one shaft 112 feet deep, one leaser's shaft 50 feet deep, and one, No. 3, about 60 feet deep, with about 250 feet of drifts. A cross-cut tunnel has also been driven 307 feet, and there is an open cut of 10 feet. The pay streak varies from 14 to 18 inches in width, including the high and low grade ores. This property has produced some of the highest grade ores found in the tellurium belt.

The Niagara is a parallel vein with the Buena, on which it joins. It is a new discovery, and is telluride in its character, and is producing some very high-grade ore, the last mill runs being 36 ounces gold for first class and 32 ounces for second class. Its development consists of a shaft 30 feet in depth with about 60 feet of drifting. Work is being actively prosecuted.

The Baltimore Belle is also situated in the same divide, about three-fourths of a mile west of the Buena, and is owned by W. R. Lafourcade, of Philadelphia, and H. B. Benton, of Jamestown. The character of the ore in this property is tellurium and rusty gold. It has for development one main shaft 75 feet in depth, and one shaft 27 feet deep, with a drift connecting with main shaft. At a depth of 50 feet in main shaft a small amount of drifting has been done. There is also a considerable amount of surface work. All the workings show a crevice averaging 3 feet in width. During the year 1882 there have been taken from this property about 260 tons of ore, which is piled up on the dump for future shipment.

The Stanislaus is situated on Big Jim Creek, about 1 mile west of Jamestown. The character of the ore is galena, copper, and iron, carrying silver and gold. It has been developed by one 20-foot shaft, an open cut on vein, and a cross-cut tunnel started. The pay streak is about 4 feet in width at bottom of shaft, the crevice being very large and mineralized from one wall to the other. The whole pay streak will give returns ranging from $30 to $40 per ton, while selected pieces run at the rate of $348, with about 15 per cent. of copper.

The Bondholder is situated on the divide between Jim Creek and Left Hand Creek, and is owned by Mrs. L. R. Evans. The character of the ore is tellurium and free gold. It has for developments one main shaft 115 feet deep, with two drifts running east and west at a depth of 50 feet, each some 50 feet in length, besides several surface openings. This property has produced a large amount of high-grade ore.

The Pewabic is situated on the northern slope of the divide. The character of the ore is tellurium and rusty gold. It has been developed by a tunnel 125 feet in length on the vein, showing a crevice of 8 feet between the walls. On the hanging wall the streak varies from 8 inches to 2 feet in width, the ore from which runs from $30 to $60 per ton; the remainder of the crevice carries streaks which mill from $100 to $3,600 per ton. This property, with the Equator, Forrest, and Wealth lodes, forms a group known as the Wealth group.

The Governor group of mines, situated a short distance southeast of Jamestown, on the left-hand divide, consists of ten lodes, viz, the Governor, President, Charter-Denver, View, Fannie H., Star of the North, Philadelphia, Jamestown, Annex, and Junction. The developments on these properties consist of five shafts, sunk to depths of from 50 to 100 feet, and a cross-cut tunnel 600 feet in length, which cuts all the lodes but two. These veins are said to be true fissures, and vary from 5 to 13 feet in width. The character of the ore in the various lodes differs greatly, some being amalgamating and others smelting and refractory, consisting of free gold, native silver, sulphurets of silver, galena, zinc, and pyrites of iron. The remarkable nature of these lodes has caused much comment from experts and scientific men who have examined them, and is generally accounted for by the fact that the great gold and silver belt of this and adjoining districts passes through the Governor Mountain. For the purpose of experimenting upon and treating these ores a large mill has been erected on Jim Creek, near Jamestown. The mines and mill are owned by a Philadelphia company.

The Song Bird combination consists of the Song Bird, Silver Cord, and Northern Light lodes, and is located near Left Hand Creek, on the southern slope of the divide between Left Hand and Jim Creeks. This property is owned by Frank S. Rearden, George W. Rearden, and Charles W. Rearden. The crevice in the workings shows a width of some 15 feet without finding the hanging wall. These properties were lately discovered. The character of the ore is galena and carbonates of lead, with sulphurets. The Song Bird has been developed by a shaft 50 feet in depth, showing a pay streak ranging from 2½ to 4 feet in width. The ore as it is taken out is stacked on the dump for future shipment, there now being piled up from 30 to 40 tons. Assays from different parts of the pay streak show it to range from 20.4 to 1,011 ounces in silver per ton.

The Little Alice is situated on the same slope, and is a free-gold and tellurium lode. It has for development one shaft 175 feet deep and 135 feet in levels. Shipments have been made giving returns as high as $15,756.56 per ton for first class, while the second class varied from $100 to $517.88 per ton.

The Golden Age mine is situated on Golden Age Mountain, at an elevation of about 8,000 feet. It has for developments one main shaft 230 feet deep, with about 810 feet of cross-cuts and levels. Besides these workings there has been a large amount of prospecting along the vein on the surface, and a cross-cut tunnel has just been started, which, when in, will cut the vein some 500 feet deep. The character of the ore is free gold, and it is the largest producer in the district this year, its output being over $40,000. Its location is about 1½ miles northeast of Jamestown.

The Gray Eagle and Potosi lodes are situated on this slope and are both promising telluride properties, in various stages of development.

There are also situated in this vicinity three silver properties, upon which considerable development has been done, viz, the Radiance and Eddison lodes, showing gray copper in a very large crevice, and the Excelsior lode, a new discovery, showing a pay streak some 2 feet in width, which gives returns of 26 ounces of silver and six-tenths ounce of gold per ton unassorted, and the following lodes which carry both silver and gold, viz, the Lib Schooley, Red Cap, Grand Master, and the Arapahoe. These properties are recent discoveries made by George W. Rearden, and are situated on the top of the divide, near the Governor group, and are very promising prospects.

The Sydney group consists of the Sydney, Last Stake, and Hercules lodes, are situated near the main road, about 1 mile east of Jamestown, and are owned by Thomas H. Nold, O. N. Heckman, and C. V. Clark. The Sydney has been developed by a tunnel on vein 54 feet in length, and by several surface openings, showing a very large crevice, with mineral cropping at the surface for over 700 feet, assaying as high as 387 ounces silver per ton. These properties are recent discoveries.

The Last Stake is of the same character as the Sydney, while the Hercules is a tellurium vein, which has been opened by a tunnel 40 feet in length and a 10-foot adit, showing a pay streak some 2 feet in width, which concentrates $360 per ton.

The S. B. lode is situated one-half mile north of Jamestown. The development consists of a shaft 40 feet deep and a short cross-cut tunnel. This property is free gold, and shows a pay streak of 18 inches in width, carrying pyrites of iron, which mills from 3 to 12 ounces of gold per cord.

The Warrior is on the same mountain, and is owned by D. H. Pike. The developments consist of two shafts, one 50 feet, the other 14 feet in depth. It is a free-gold quartz vein, lying between black granite and porphyry walls, showing a pay streak proper of about 2 feet in width. First-class ore has yielded as high as 22 ounces of gold per ton, while the whole body contains about $50 per cord and is free milling.

The Gold King lies near the Warrior and is also a free-gold lode. It is a new discovery, having been located this fall. It shows a crevice of about 4 feet, with a pay streak of from 6 to 18 inches. It has been developed by a shaft 28 feet deep, and a tunnel on the vein some 50 feet in length. The last shipment made gave returns of $484 gold per ton; the production so far has been about 5 tons of ore.

Springdale is situated about 1½ miles below Jamestown, on the left bank of James Creek, and is the second town in size in Central mining district. The character of the ores near here is principally of the telluride order of the highest grade. Among the prominent mines are the following:

The Rip Van Dam, situated in Castle Gulch, just north of town. It has for development one open surface cut 40 feet in length and two shafts, one 55 feet, the other 30 feet in depth, and a tunnel (this year's work) on the vein 200 feet in length, all the workings showing a pay streak varying from 1 to 3 feet in width. Assays from this property have been had as high as $106,000 per ton, while the second-class ore shipped to Boulder brought, net per ton, $296.48. This property is owned by Messrs. Higby, Lafourcade & Hill. There are now on the dump about 75 tons of ore that will concentrate at the rate of from $40 to $50 per ton, while there have been shipped to the mill at Boulder about 3 tons of first-class ore.

The Gladiator is situated on the northern slope of the mountain opposite the town. The ore it furnishes contains nearly all the tellurides, combined with free gold, known in mineralogy. The development consists of a main shaft 100 feet deep, and one shaft about 30 feet deep, with several surface openings. This property shows a pay streak proper averaging 5 to 12 inches in width, while accompanying it is about 3 feet of second-grade ore, that ranges in value from $20 to $60 per ton, shipments from first-class ore bringing at the rate of $400 per ton.

In Castle Gulch are situated the following fine telluride properties, all of which produce ore of the highest grade and all being in various stages of development, viz, Big Blossom, Grand Central, Twin Blossoms, Lily of the West, Earl, Rambler, King William, Badger, and the Grand Union.

The Ellen is on the same vein as the Gladiator, the ore being of the same character. This property has been largely developed.

Ballarat is situated in Central mining district, about 4 miles northwest of Jamestown, with which it is connected by a good road.

Here is situated the celebrated Smuggler mine, which has been the largest producer of telluride ores in the world, its output having been something over $600,000. During the present year there has been very little done on this property except in the development line, the ore taken out bringing about $5,000. The amount of development on this mine up to the present time consists of one main shaft 360 feet deep and one shaft 175 feet deep, with 2,000 feet of levels and cross-cuts, all of which show a crevice which averages 4 feet in width, the ore from which will average as follows: First class, $5,000 per ton, and second class, $300 per ton.

In this immediate vicinity is the Saint Julien, a telluride lode, which is a recent discovery. This shows a crevice of about 4 feet in width, with a pay streak of from 4 to 6 inches in width. Development is being rapidly made, and the property bids fair to soon be a large producer, the first-class ore bringing at the rate of $10,300.

There are also in this camp the following properties, many of which are likely to be good producers when further developments are made, viz, the Boreas, Prussian Prince, Mountain Queen, Black Prince, and numerous others.

Camp Providence is also in Central mining district, and is situated about 3 miles west of Jamestown, on Big Jim Creek. The character of the ore in this vicinity is telluride. Among the mines are the following:

The John Jay was one of the first discoveries in which telluride ore was found. It is believed to be a strong, well-defined, true fissure vein, varying from 4 to 7 feet in width between good solid walls of porphyry. The developments consist of one main shaft 250 feet deep, with 550 feet of levels. The average value of the best ore is from $400 to $500 per ton, while they have a large quantity of low-grade or milling ore that is worth from $20 to $50 per ton.

The Last Chance is an adjoining parallel vein with the John Jay, having the same characteristics of that property, the vein and the ore being much of the same size and value. The developments consist of one main shaft about 140 feet deep, with about 200 feet of levels. There is also a second shaft about 80 feet deep.

In this immediate vicinity are the following valuable telluride properties, all being recent discoveries, viz, the Wild Cat, Joe Dandy, Roanoke, Hope, Clipper, Chicago, Eureka, and Brunswick. The last named is of unusual promise, and has produced in the neighborhood of $3,000 worth of ore with the little work that has been done on it this fall and winter.

The Ten-Forty is situated about 2 miles west of Jamestown. The developments consist of a tunnel on the vein some 75 feet in length. The crevice varies from 8 to 12 feet in width, with the pay ore lying in chimneys throughout. The character of the ore is gray copper, galena, and black sulphurets carrying silver, returns giving from 65 to 300 ounces in silver per ton.

The following is the production of Central district during 1882:

Mines.	Gold.	Silver.	Total.
Golden Age	$63,000	$2,350	$65,350
Mountain Chief	2,800	2,585	5,385
December	400	118	518
Colfax	1,000		1,000
Rattler	100		100
Grand Central	250		250
Rip Van Dam	2,600	118	2,718
Gold King	1,000		1,000
Mineral Point	250		250
Princes	200	59	259
Brunswick	2,600	470	3,070
Big Thing	600	2,820	3,420
Saint Julien	472	33	505
Niagara	700	100	800
Gladiator	500		500
Earl	150		150
Smuggler	3,333	1,959	5,292
Small lots shipped from minor properties—estimated	750	2,291	3,041
Total	80,705	12,903	93,608

In this review the principal producing mines of Boulder County have been described or noticed so far as reports have been received or information regarded as reliable in respect to their production has been accessible. Many other mines are being developed, some of which have added more or less to the total product of the county.

Upon receiving the returns of the mines, production of mills and smelters from Boulder County ores, and shipments by express, I have estimated that Boulder County's product for 1882 was, gold, $260,000; silver, $310,000; total, $570,000.

CHAFFEE COUNTY.

The mining interests in Chaffee County have not made any great advance during the year. There are an immense number of gold and silver bearing lodes in the mountain ranges traversing the county from north to south which yield medium and in some cases high grade ores, but the richer deposits of Lake County, adjoining on the north, and of Gunnison, on the west, have attracted greater attention and diverted capital which otherwise might have been employed in the development of the mines of this county.

In the northeastern portion is the old district of *Granite*, situated east of the Arkansas River. The lodes here are gold bearing and the ores are of low grade. The district was organized twenty years ago, and for a time was a scene of busy industry; the veins above the water line were free-gold bearing, and considerable gold was extracted by the rude mills erected at that day, but subsequently the ores became refractory, and one after another the mines suspended operations, and but little has been done since that time.

The Leadville excitement reawakened the camp, and in 1879 the Granite Gold Mining Company, having purchased the O. K., Alta, Robert Thompson, Ivanhoe, Georgie Bell, and Hercules mines, remodeled one of the old stamp mills, but the improvements consisted simply in improved amalgamation plates, which, though useful in free-milling quartz, were not proper for treating refractory ores. They proceeded the next year to erect the Robertson mill, an old process with a new name, that had been condemned in California years before. It consisted of a little crusher, a large brick furnace with a slight incline, a bath, grinder, three pans, and an amalgamator. But one run was made, of about two weeks, and operations were suspended.

There are about twenty-five mines in Granite district that have shafts down from 100 to 260 feet, with numerous levels and stoping ground ready for active work, and hundreds of tons of mineral are now lying on the dumps which will average $25 to the ton. The difficulties met with in the working of this grade of ore some day will be overcome, and the mines of Granite district will doubtless become valuable producers.

Hope district lies west of Granite and extends from the Clear Creek divide to the northern boundary of the county. The chief mining is placer, Cache Creek and Lost Cañon being the principal producers.

The Gaff Mining Company, under the management of Walter H. Jones, own nearly all the gravel deposits in Cache Creek, and during the season worked about 20 men with considerable success.

In Lost Cañon, west of Cache Creek, and situated high on the mountain, are the placer mines of Mr. J. C. Hughes; the gold is coarse and in nuggets.

A number of gold-bearing lodes have been discovered on the adjoining mountains, but have not been developed to any extent.

La Plata or *Clear Creek district* is south of Hope district, and extends to the divide south of Pine Creek, and from the Arkansas River west to the summit of the range dividing it from Gunnison County. It includes the subdistrict of Pine Creek. Granite is the prevailing formation, though the country is traversed in some localities with ledges of porphyry, lime, and mica schist. The ores are chiefly galena, gray copper, and sulphurets, with some chloride, antimony, and occasionally native silver and silver glance. The district is only two years old, but mining camps have been started at Beaver, Vicksburg, Rockdale, and Winfield—Vicksburg and Winfield being the chief.

On Iron Hill, in the vicinity of Beaver, are the Valley, Deserted, Kalamazoo, Hercules, Crœsus, Stinson, Emma, and Hastings.

On the Valley and Deserted, tunnels of about 50 feet in length, each shows a 7-foot vein of copper, galena, and spar that runs 16 ounces silver, 1 ounce gold, and 20 per cent. lead.

The Kalamazoo has a crevice 6 feet wide, with quartz containing oxide of iron and manganese, sulphuret of iron and copper, carbonate of copper, galena, and chloride of silver. Assays as high as 73 ounces silver and 9½ ounces gold to the ton have been obtained. A cross-cut was started which reached the vein in 30 feet, showing up 5 feet of low-grade ore. Believing this to be a mere spur, the tunnel was continued for 100 feet farther, with a better showing. This mine will prove to be valuable property when it has been more fully developed.

The Duke is an extension of the Kalamazoo, and contains similar ore.

The Crœsus contains high-grade ore, but the vein is narrow; so far as developed it shows some improvement in size of the ore-body. Assays have run over 400 ounces of silver to the ton.

The Stinson is an extension of the Crœsus. It has a bold outcrop, with rich surface ore assaying 50 ounces in silver and $50 in gold per ton. In running a cross-cut to strike the vein, a parallel vein was cut, which was about 2 feet in width and contained medium-grade ore.

The Emma is opened by an incline showing sulphurets and galena averaging 110 ounces of silver and $10 in gold per ton.

On the south side of Clear Creek, and opposite Iron Hill, is Belford Basin. One of the principal properties is the Borst Mineral Farm, comprising eleven claims, among which are the Birdie, Mary, Fannie Borst, Grand Trunk, and Santa Fé. A tunnel is being run to all these veins.

The Abbot Mining Company own the Boyden, upon which there is a 40-foot tunnel that shows up a foot of ore at the breast. Assays from this mine range as high as 197 ounces silver. The ore is sulphuret and galena.

The Robert Bruce has three crevices on the same territory, two of which have been worked to the depth of 25 feet, one 6 feet wide, another 3 feet, carrying galena in large quantities, brittle silver, chlorides, gray copper, native silver, and oxides of iron and copper. These veins assayed on the surface 110 ounces, and assays as high as $281 to the ton have been obtained.

The Bullion is located southeast of the Borst Mineral Farm. It is a 3-foot vein of average grade ore, with a streak of sulphurets varying from 2 to 6 inches, from which assays have been obtained as high as 903 ounces of silver. It is worked by a shaft which is now down 47 feet.

Across the dividing ridge west of Belford Basin is Missouri Gulch, in which one of the chief mines is the Yankee Doodle. A tunnel of 55 feet was driven which tapped the vein at a depth of 50 feet, revealing a well-defined fissure, with two perfect walls 3½ feet apart, showing an 18-inch pay streak. A second tunnel was started, lower down, which is now in 54 feet, and will ultimately tap the vein at a depth of 200 feet. A tramway will be built from the mouth of the lower tunnel to the creek. A considerable amount of ore has been shipped.

The Tip Top, Falcon, and Zenobia are on the same lode.

The Tip Top shows 18 inches of bromide, carbonate, and oxide of copper, galena, and iron that assays $126 in gold, silver, and copper. A tunnel is being run on the vein.

The Falcon is opened by a shaft. The foot wall of the vein is porphyry, while the hanging wall is granite. The ore is sulphurets, galena, and copper in various forms, and the pay streak varies from 10 to 20 inches, which gives assays ranging from 78 to 259 ounces silver to the ton.

The Glencove Mining Company, D. H. Summers superintendent, own the G. and C. mine, and are running a tunnel on the vein; at 30 feet in it shows galena, iron, and copper, a 12-inch vein which is widening with development.

On Mount Hope a large number of locations have been made, some of which are growing into prominence.

The Mammoth shows a large true fissure vein 40 to 50 feet in width, with about 20 feet of mineral, 4 feet of which is a rich galena and sulphuret ore that mill-runs over 100 ounces silver, and the balance about 25 ounces.

The Swiss Boy is perhaps the most important property on the mountain. Mr. W. C. Parker, the lessee, is working a force of 12 men, which will be increased as soon as the mine is opened sufficiently to make room for more men. The development consists of a tunnel 100 feet, near the heading of which the Silver Crop, an intersecting lode, has been cut, and a winze is being sunk at that point; the junction of the two lodes affording an opportunity to drift four ways from the bottom of the winze. At a depth of 60 feet a level will be run to connect with a shaft which is being sunk near the mouth of the tunnel. The workings all show an excellent body of mineral of good grade, and though nothing but dead work has been done, yet the shipments have averaged something over a car load a month, ranging in value from 65 to 80 ounces to the ton. The shaft shows about 18 inches of mineral carrying native and wire silver, gray copper, and galena. The shaft is 40 feet deep, and being put down rapidly. At a depth of 60 feet levels will be run each way from the bottom, connecting with the winze in the tunnel. With the large body of stoping ground thus opened it is safe to say that the mine can easily turn out a car load a day of good shipping ore.

The Hettie is an extension of the Silver Crop, and, as far as developed, shows high-grade ore.

The Rockdale is a 5-foot vein with an ore streak of 10 to 18 inches, that gives an average assay of 500 ounces silver. The ore is a white quartz containing silver glance, from which specimen assays reach 1,400 ounces silver.

Winfield is situated at the junction of Right and Left Forks of Clear Creek, and is the principal camp in the district.

On the Right Fork the principal mines are in Mystery, Gray Copper, and Black Bear Gulches.

On the east side of Mystery Gulch is a group of claims owned by Buena Vista parties, the principal being the General Sheridan, Moltke, and Bismarck. They all give high assays in gold and silver, the ores being sulphurets and galena.

The Denver Girl, San Francisco Mint, Silver Bell, and Stonewall Jackson form another group of fine claims, upon which considerable development work has been done. A cross-cut tunnel is being run to tap all the veins which have bold, strong outcrops assaying high in silver.

At the head of the gulch is the Mother, on which there is a 20-foot open cut and tunnel, which shows the vein 8 feet in width, with a pay streak running through the center 10 inches in width that assays $90 in silver and $10 in gold.

In Gray Copper Gulch is the Toutine, which yields very high-grade ores of gray copper and galena.

The Artisan Mining Company own a number of promising locations.

In Black Bear Gulch is the Baracouta, which was the first mine that created the excitement on Clear Creek in the fall of 1880. In order to obtain depth rapidly an incline tunnel was started on the vein in the winter of 1880–'81. This proved to be an unwise method of development, for at a distance of 60 feet water was encountered, and a deep open cut had to be blasted out to give it a water grade. However, a mill run of 103 ounces of silver warranted the owners to proceed to open the mine in a methodical manner. The ore is galena, pyrites of copper, zinc, and iron, from which specimen assays have been secured from $80 up to $799. The vein shows 15 feet in width at the surface, and crops out for a distance of 1,200 feet. In the breast of the tunnel are two distinct pay streaks, one 12 inches in width and the other 22 inches, with a vein of white quartz between them.

The Kangaroo and Melbourne are extensions of the Baracouta; only assessment work has been done upon them.

The Rosa Wells vein shows 4 feet in width at the outcrop, the character of the mineral being galena, copper, and iron. A cross cut tunnel is now being driven which will tap the vein at a depth of 100 feet. The tunnel is now in 135 feet, and is expected to strike the vein inside of 30 feet. A vein 12 feet wide has been cut, in running the tunnel, that has a 12-inch pay streak on each wall that assays 13 ounces of silver. This tunnel has been worked at an average cost of $3.50 per foot.

The Pirate is on the same vein, which is being cross-cut for and will strike at a depth of 50 feet.

The Silverdale Company own a group of valuable claims, prominent among which are the Carrie and Little Ella, opened by two levels, showing a vein upwards of 20 feet in width.

At the head of the Right Fork, and running through the Continental Divide, is the Free Republic. The main vein is 50 feet in width, with a parallel vein 14 feet in width. The ore is galena and pyrites of copper. A tunnel has been run in on the main vein 90 feet in length, which shows over 3 feet of solid mineral at the breast, carrying antimonial silver that assays as high as 131 ounces of silver.

The Fortune on Middle Mountain has a vein of 80 feet in width, and a cross-cut tunnel of 65 feet, which is expected to reach the hanging wall in 10 feet, shows up strata of crystallized quartz carrying iron and copper pyrites, galena, sulphurets, and gray copper, from which assays have been made, ranging from 205 to 700 ounces silver. There are from 2 to 3 tons of high-grade ore on the dump, and about 20 tons of concentrating ore.

The Brooks mine, a southwestern extension of the Fortune, has the same character of quartz, carrying pyrites of copper and gray copper.

On the Left Fork is the Carrie Borden, on which the owners are driving a tunnel, which follows the foot wall of the vein and is now in 76 feet. The vein shows in the tunnel from 6 to 8 feet in width, carrying sulphide of copper, iron, and galena. An assay by the Denver Mint gave $175 in gold and silver and $102 in copper. This property is owned by the Denver and Rio Grande Engineers' Mining Company, who also own the American Flag and John Kelcher, both on the same vein, which show up at the outcrop 38 feet wide, with three pay streaks of 12 inches, 18 inches, and 5 feet in width.

On Pine Creek the White Cloud lode shows a 10-inch pay streak of galena ore running from 100 to 175 ounces in silver.

The Champion, near the above, is a fine-looking vein, with defined walls and a pay streak averaging 100 ounces in silver. The whole vein between walls, about 4 feet, will run 60 ounces in silver.

The White Cloud and Champion are owned by Toomey, Young, and others. They are working 4 men.

The oldest locations are the Black Prince and I. X. L. The first shows a 4-foot vein, with a 16-inch pay streak carrying sulphurets and native silver that assay from 229 to 936 ounces silver, with a mill run of 73 ounces. The shaft is 83 feet deep. The I. X. L. is a 6 foot vein, with 18 inches of galena and sulphurets that assay 337 ounces silver.

The Allegheny, Silver King, Hawks' Hope, Delaware, Lake View, Copper King, and Flag Staff are prominent prospects.

The Flag Staff, owned by Lawson, Kelley, Pond, Cunningham, and Macke, has a 55-foot tunnel, with vein showing assays ranging from $375 to $3,480; a mill run gave $563. Vein matter from 6 inches to 2 feet wide.

Cottonwood district, subdivided into North, Middle, and South Cottonwood, extends from La Plata district on the north to Chalk Creek district on the south, and from the Arkansas River on the east to the western confines of the county.

Buena Vista, at the mouth of the Cottonwood, is the chief town and supply point for the district.

On the North Cottonwood there are a number of locations in which the surface ores are in many cases extremely rich, but their development has not progressed to a sufficient extent for them to rank as producing mines.

At the head of the gulch is the Independence group, with strong outcrops of galena and quartz from 3 to 6 feet in width, and assaying from 18 to 25 ounces of silver and 40 per cent. in lead.

The Hidden Treasure is perhaps the most prominent lode. A cross-cut tunnel has been run, tapping the vein at a depth of 50 feet.

The Red Deer has been opened by a shaft about 90 feet deep, showing galena and pyrites.

The Easter lode is one of the prospects opened in that district within the past year. At a depth of 20 feet a body of sulphuret ore 2 feet in width has been struck, carrying native silver. The vein is 6 feet between walls, and is well defined. Assays of 200 ounces have been obtained. Work is being actively prosecuted by the owners.

On the Middle Cottonwood the Gladstone is the principal mine. The vein measures 6 feet in width, nearly all of which is good ore, being flecked with native silver. A 6-inch streak of silver glance appears in the vein, which is exceedingly rich, and must give a fair average to the entire output. It has over 500 feet of development, consisting of a cross-cut of 110 feet, a drift west from the end of the cross-cut, a winze now down 40 feet, a drift west from the bottom of the shaft, a shaft on the east slope of the hill about 60 feet deep, and a tunnel on the vein. All of these workings show good mineral, the winze furnishing about 8 inches of very high grade sulphuret, silver glance, and native silver ore. In sinking the winze about 10 tons of this ore has been extracted, and the daily output from dead work is about 2 tons. The purpose of the owners is not to take out ore for shipment, but to develop the mine by a system of levels and winzes so that when the ground is properly opened the output can be made accordingly. During the progress of the dead work, however, more than enough ore has been necessarily extracted to pay expenses and leave a good profit besides. Assays and mill runs of the ore range from 76 to 700 ounces. A shipment of 8 tons lately made yielded over $600 after paying all expenses.

The Gladiator group, on the same hill as the Gladstone, comprises five claims: the Gladiator, Edwin Booth, Diamond Cross, Cyclops, and Silver Star. A tunnel which is being driven on one of these lodes, now 450 feet under cover, will cut the others at such depth as will insure large backs of ore above the tunnel level. The several veins are developed by shafts, having an aggregate of 150 feet of work. The vein now opened in the tunnel is producing some good ore containing galena, sulphurets and silver glance, having an average value approximating $70 per ton. According to the engineer's estimate, 15 feet of additional forward work will cut the first of the five veins named above.

The Diamond Cross is also being worked by a shaft, and shows a few inches of very fine ore resembling the Gladstone. The whole group makes a promising showing, and when the main ore-body is tapped by the tunnel mentioned will be a valuable property. The group is owned by W. W. Butler & Co.

The Monitor, some 2 miles farther up the gulch, is developing into a promising mine. A shaft has been sunk 92 feet, showing 30 inches of good mineral, which mill runs 28 ounces in silver and 38 per cent. in lead. Selected assays have run over 100 ounces.

Just north of Spring Ranch is the Friendship, in which about 10 inches of galena, assaying as high as $500 in silver to the ton, has been exposed near the surface. Two tunnels are being run to cut the lode, which are 90 feet and 155 feet respectively in length.

Southwest of Buena Vista is Mount Princeton, on which a large amount of work has been done.

In Maxwell Gulch there is a group of locations which make a good showing; they are the Guthrie, Silver Queen, North American, and Piermont.

The Guthrie, at a depth of 16 feet, shows 2 feet of carbonate of lead, iron, and quartz, assaying $138, the average of the whole being $90.

The Weber Gift, on the south slope of the same gulch, has had only assessment work. The mineral is in place and the walls are well defined.

The Little Cuba is situated near the head of the gulch. It is 8 feet between walls, and carries an 8-inch pay streak of galena, gray copper, and iron, running as high as 100 ounces in silver. An incline has been sunk 33 feet by the owners, Dougherty & Edwards.

The Cornucopia and Prairie Boy both make a good showing for the amount of work done.

Across the ridge from Maxwell Gulch is Dry Gulch, on the north side of which is the Weber, an extension of the Prairie Boy. A shaft has been sunk 30 feet, exposing 3 feet of galena, copper, and iron, milling from $30 to $40 to the ton. The water came into the shaft so rapidly as to make it necessary to suspend work and run a cross-cut below to drain the shaft. This is being done, and work in the shaft will be resumed.

The Dandy Consolidated Mining Company own the Dandy and Encyclopedia. The company is working 15 men and conducting development in a systematic manner. The ore is galena and sulphuret of iron.

The Dandy mine has furnished some of the highest mill runs and assays of any mine in the county. Of sixty samples from all parts of the vein, tested by assay, eleven returned from 27 to 95 ounces of silver, nine from 100 to 200, nine from 200 to 500, four from 500 to 1,000, ten from 1,000 to 2,000, and seventeen from 2,000 to 6,400 ounces per ton. This indicates a high average.

South of the Dandy group are the Fay, Frankie, Diamond, Gray Eagle, Amherst, Wild Irish Boy, Chicago Boy, and Sharp's Bonanza, owned by the Sharpe & Fleetwood Tunnel Company. Three tunnels are being driven, which will cut all the veins at different levels, some of them at great depth.

The main workings at present are on the Wild Irish Boy lode. This property has been opened at several points to a depth of 30 feet by a tunnel on the vein for the purpose of proving its continuity, and in all openings an ore vein of 10 inches is disclosed. The mineral is high in grade, the values occurring in the form of fine steel galena, silver sulphides, sulphurets, and free silver. The general formation is granite, but a ledge of lime about 30 feet thick cuts through the granite, just below the Wild Irish Boy, and the lower tunnel on the property will cut through this ledge at considerable depth. If these deeper workings shall prove that fissures have occurred along the plane of contact of the granite and lime, discoveries of importance may be made.

The Young America group, which is an extension of the last-named mines, and comprise the Young America, John A. Logan, Little Charlie, Donovan's Prospect, Capital, and Smiling Annie claims, all show mineral, and a cross-cut tunnel 100 feet in length has been started which will develop the veins at greater depth.

On the south side of the mountain is the Hortense, upon which a large amount of work has been done, not only on the mine, but also on its approaches. During the year the company has completed an excellent wagon-road from the base of the mountain to the mouth of the cross-cut tunnel, which has also been finished 700 feet in length, and is now the chief means of exit and entrance to the workings of the mine. Large ore reserves are in sight, and a fine body of stoping ground opened. No attempt has been made to extract ore for several months, owing to the determination of the company to erect suitable works for the reduction of their own product in the spring. By the time the weather admits of the building of these works it is safe to say that the capacity of the mine can be readily maintained at 20 to 30 tons daily. While there is a good deal of low-grade ore, there are, in some of the workings, exceptionally rich streaks.

On the same ridge is the property of the Lily White Company, consisting of seven claims. The group is located in an undoubtedly rich and heavy mineral belt. There is every reason to believe that with proper management it will rank with the leading properties in the county.

There are a large number of other properties of lesser note, many of which promise well with development.

This mountain contains a large number of mineral-bearing lodes, and, to a great extent, has not been thoroughly prospected. It was not until about two years since that any prospecting of importance was done on the eastern and northern slopes. The heavy slides and precipitous character of the mountain, combined with a lack of trails, were sufficient obstacles to keep away the advance guard of prospectors for a long time after the surrounding territory had been explored.

On the northern slope of Sheep Mountain are the Lottie and Martha Bonne, upon which considerable work has been done—enough to demonstrate that good mineral undoubtedly exists in the claims. The slide on the northern slope is not so deep as that on the southern, and the lodes have a good outcrop.

The Herrick Mining Company own the Kerr and Herrick mines, on the opposite side of the mountain. A large amount of work has been done on the Kerr tunnel, and about 5 feet of quartz and crevice matter is exposed in the main tunnel, and 3 feet in another working which has been run at right angles. The lode is located in a heavy slide, and mineral has not yet been found in place.

On Mount Carmel is the Mount Carmel mine, with a vein upwards of 30 feet wide, which is developed by a tunnel of 125 feet and one of 60 feet. At the heading of the first a shaft has been sunk 50 feet down from tunnel level, and in the second one of 25 feet in depth, both on the vein. On the hanging wall of the vein is an ore streak 3 feet wide, and on the foot wall another of half that width, while all of the intervening vein matter, chiefly talc, is highly mineralized. The trend of the lode is nearly north and south, and for nearly half of the claim's length the apex of the vein has been denuded by erosion, and is a prominent feature of the mountain. The walls are clearly defined and solid. A fair average of the ore returns a value of $50 a ton. Some of the stringers, however, are exceedingly rich, and, with ordinary care in hand picking, the grade could easily be brought up to $100 per ton. This vein, unlike many others in the vicinity, is a contact.

South of the Mount Carmel, and further down the mountain, is situated the Commonwealth, which is being developed by a tunnel, the heading of which has been advanced 150 feet under cover. The tunnel will likely cut the Mount Carmel lode at a considerable depth. This mine is the property of Durrell Brothers, who also own the Sebago, which is being opened by a cross-cut tunnel.

West of Mount Carmel is Gracie Mountain, on which are the Gracie and Addie, the latter being an extension of the Gracie, on which a tunnel has been driven through 160 feet of talc, cutting the top of the vein; the total length of the tunnel is over 290 feet.

On the Addie the vein is over 4 feet wide, and shows honey-combed quartz and a streak of hard carbonates, which mill-run 33 ounces in silver to the ton. A tunnel was run to cut the vein, but work was retarded by caving, as the ground was much broken.

The Lexington and Cashier, on the same mountain, contain some high-grade ore.

Across the gulch from Gracie Mountain is Eureka Mountain. The principal locations are the Potomac and Gray Copper. The former contains sulphuret ores, yielding from 300 to 700 ounces of silver.

The Gray Copper is opened by an incline 18 feet and a drift 35 feet, showing 2 feet of galena and oxide of iron. An assay on the foot wall yielded 92 ounces in silver.

Fox Mountain lies east of Eureka Mountain, and contains some excellent claims.

On the Cora Bell there is a tunnel 200 feet long, showing 4 feet of decomposed quartz and talc, and a shaft 50 feet, from the bottom of which a drift has been run 106 feet, striking solid formation. The drift was run on a slip or break in the vein, and the course will now be changed to strike the main ore-body. About 100 tons of ore are on the dump, mill runs of which will yield 50 ounces silver, 35 per cent. lead.

The Charlie D is an extension of the Cora Bell. A tunnel on the vein has been driven 40 feet and a cross cut 64 feet, which will cut the lode at 125 feet in about 60 feet further. The vein shows 8 inches of galena and copper, assaying from 400 to 700 ounces silver to the ton.

Further south is the Green Copper lode. A tunnel has been run 100 feet, and a shaft, sunk at a distance of 40 feet from the mouth, is now 26 feet deep. The bottom of the shaft shows 2 feet of galena and quartz with some iron, assays ranging from 33 ounces in silver to $182 in gold and silver at greater depth. Mill runs give returns of $14 to $30, and show that it is good concentrating ore. There are at present 50 tons on the dump.

The Bonaparte and Emma are fair-looking prospects.

The Doctor, owned by Hawley, Gilmore & Co., has a 4-foot vein, ore from which assays 52 ounces of silver to the ton.

The Umbagog at the mouth of Humphrey's Gulch is one of the oldest locations in the lower end of South Cottonwood. The surface showing was so encouraging that the owners, Kinsman, Brown & Co., decided to run a cross-cut lower down the hill to tap the vein at greater depth, and have now run in over 70 feet, and expect to cut the vein any day. Assays of the surface croppings gave returns of $300, and the vein is 15 feet wide.

Further up the gulch is the Bostick, which is opened by three shafts, 110, 80, and 25 feet deep; the average showing in No. 1 being over 2 feet of coarse galena, which runs 40 per cent. lead and 5 to 6 ounces silver. No. 2 shaft shows different ore, and picked specimens have assayed 700 ounces.

The Monitor, owned by Robbie & Co., is down 40 feet, showing lead and copper that assay 17 ounces silver on surface.

On the south side of Jones Mountain the El Dorado Company own a group of mines, the chief of which are the El Dorado, Little Missouri, Amanda, and Fraction.

The El Dorado yields carbonate and galena ore; assays ranging in value from 60 to 85 ounces in silver and 46 per cent. lead. A car load of the ore on the dump was shipped to Cañon City, which gave an average value of 40 ounces in silver and about the same per cent. of lead.

On the Little Missouri, which has been opened on a very heavy outcrop of iron carbonates, a tunnel has been run a distance of about 100 feet. Other openings along the surface show the strength and character of the deposit.

The Amanda has been developed by a 60-foot tunnel, showing an average of over 2 feet of carbonate of lead, sample assays from which have yielded 44 ounces silver and 60 per cent. lead.

The Atlantic produces some high-grade ore. No defined vein has been developed, but the mineral is found in pockets connected by stringers of ore. The average value is about $100 per ton.

The New York Company own the New York, Toronto, Hancock, Niagara, and McClellan, situated in Mineral Basin.

The New York is opened 40 feet, showing copper and galena.

The Toronto yields ore assaying as high as 250 ounces; it is developed by a shaft of 60 feet in depth.

On the Hancock there is a steam hoist, the shaft is 86 feet deep, and a drift from the bottom has been run 26 feet.

The Emlenton lode lies between the property of the New York Company and the mountain. A tunnel has been run 60 feet to cut the vein. Surface prospecting shows a 15-foot vein of copper, galena, and iron. From present indications this property bids fair to be among the best in the basin.

The Longfellow has an immense iron outcrop nearly 200 feet in width. It is an excellent quality of brown hematite, interspersed with white iron, peacock copper, and pyrites. Two shafts have been sunk on this property within a distance of 100 feet, one about 25 feet and the other 30, both of which abound in mineral, though not high grade.

Chalk Creek district lies south of and adjoining Cottonwood. The general formation of the country is granite, though some porphyry is found. The veins are fissures and are strong and well defined.

On Murphy Hill, a western spur of Chrysolite Mountain, is the celebrated Murphy mine, the best developed and most important mine of the county. The discovery shaft is near the summit of the hill, and the claim extends down both the north and south slopes. There are two parallel veins, the Pat Murphy and Mary Murphy, the principal developments having been made upon the latter. The mine has been systematically worked by tunnels or levels and connecting winzes.

From the discovery shaft a level is pushed to a point beneath the center of the dividing line of the mountain, and a shaft sunk to level No. 2, 100 feet below. This shaft is termed winze A.

Level No. 2 connects with winze A at a point 169 feet in, and continues on to a total length of 425 feet. This level was started on the outcrop of the vein, which has a general average of 5 feet between walls. At a distance of 107 feet from the mouth of this level, winze B has been sunk a distance of 80 feet to connect with No. 3 level, and this is also in pay ore.

Level No. 3 is 550 feet long, but work is being performed on an additional 50-feet contract. No. 3 level, 80 feet vertically lower than level No. 2, was run 65 feet in slide before the vein was encountered, which has widened to 8 feet between walls. This level, 136 feet from its mouth, connects with winze B and continues on 349 feet further to present terminus. From this level two winzes are sunk, winze C at a point 30 feet from winze B, and winze D just where the level encountered ore, 65 feet from the surface. Both these winzes connect with level No. 4, 80 feet vertically below, and were pushed down through pay ore. From top of winze C up to winze B the ore has been stoped out and marketed. In level No. 3 the vein is from 8 to 12½ feet in width, and mills in bulk from $90 to $150 per ton.

Level No. 4 is 80 feet vertically lower than No. 3, and 425 feet in length with a 54-foot contract in progress. This level pushed through 158 feet of slide to reach the vein, and from this point at a distance of 50 feet connected with bottom of winze D, and heads 217 feet beyond, having an aggregate length of 425 feet. Winze E was started 9 feet from winze D, and sunk 80 feet to level No. 5. In No. 4 level, winze C from level No. 3 is not yet reached, but will be in 10 feet more. Here the vein maintains a width of from 11 to 16 feet between walls, encasing ore worth $90 to $150 per ton.

A main tunnel site has been projected to cut the vein in a distance of 1,500 feet, at a point 808 feet vertically below the mouth of level No. 4, and when carried a distance of 2,100 feet will be directly under the crest of the mountain, with a depth of 1,132 feet. This tunnel will be rapidly driven.

Development and deep exploitation have shown a record of increasing richness in the ore-body, especially in level No. 3, where the last 200 feet have steady value of $600 to $700 per ton, and also that the vein has gradually extended from 5 to 13 feet of average width.

The ore as extracted is taken by a tramway of a total length of 4,996 feet, running from opposite the mouth of No. 4 level to the east side of the South Park Railroad at the foot of Pomeroy Mountain. It is a single endless traveling wire rope, of Hallidie's system, passing over fifty stations from 75 to 100 feet apart. The rope carries ninety-six buckets of 200 pounds capacity each, automatically charged and discharged, and so arranged that the ore dumps into cars upon the railroad track or into bins over the track. The motive power is gained from the full descending buckets, which not only returns the empty buckets, but also brings up the mountain mining timbers, &c., and the wire is provided with eight pairs of hooks for this purpose. The capacity of this tramway is 128 tons in 20 hours, the speed being so regulated that a bucket travels the circuit in just forty minutes. Only two men are necessary to operate it, one being stationed at each terminus to attend to the brakes when required.

At the lower end of the tramway are the mill site of the company, and the general office, assay office, and boarding houses, cabins, &c., for 40 men.

During the year the work was confined chiefly to developing and opening the ore-body, no stoping was done, and but one shipment made of 500 tons of ore taken out in running levels and sinking winzes.

An English company have been negotiating for nearly a year for the purchase of this mine, and it is reported that a sale has been effected, including the Pioneer and Mollie, the northern extensions of the Murphy.

The Pat Murphy vein, although of great strength and richness, is but partly developed, having a tunnel of 146 feet, giving a depth from the crest of the hill of 100 feet upon a large body of fine ore. Below this level, 100 feet vertically, a second tunnel has been driven 230 feet on the vein, which is 13 feet wide in solid ore, having a value of from $60 to $120 in silver and gold to the ton.

The Pioneer is the first extension north of the Murphy. A tunnel has been run 45 feet, at which point a cross-cut to the right passes through mineral 22 feet to the hanging wall, and then follows along it to the breast, 60 feet further. The cross-cut in the direction of the foot wall has progressed 12 feet in barren rock, believed by the owners to be a "horse" from the fact that surface exploitation by a shaft has disclosed a foot wall 22 feet east of the line of the tunnel and parallel to it, with mineral adjacent the full width of the shaft.

North of the Pioneer is the Mollie, which has croppings of immense width; 75 tons of ore shipped from the surface workings ranged in value from 4 to 13 ounces in gold and 30 to 65 ounces in silver. The whole face of the vein for a width of 100 feet gives a value of one ounce in gold per ton to this ore, which is free milling.

The Iron Chest, an extension of the Pat Murphy vein, has been exploited by a tunnel 300 feet in length along the vein upon a pay streak 3 to 5 feet in thickness. One hundred and fifty tons of ore have been shipped to Pueblo. The net value of these shipments has been from $60 to $200 per ton.

The Livingston is the southern extension of the Murphy, and is developed by four levels of 280, 460, 275, and 70 feet, respectively. The winze running down from the fourth or lowest level of the Murphy on the main vein shows their vast and rich mineral body to be running directly into the center of the north end of the Livingston ground.

This alone would be sufficient to prove that it will become a mine of permanence and value.

West of the Murphy and parallel with it is the Tressa C. Drifts are being run in both directions from the bottom of the shaft, and John Gottlander has taken a contract to run a drift from the surface to meet the south drift. Fourteen men have been employed.

The Comstock is located east of the Iron Chest, and is developed by a tunnel 200 feet in length, exposing a very strong pay vein similar to that of the Iron Chest, and carrying 60 ounces in silver and from 1 to 3 ounces in gold to the ton.

Pomeroy Mountain lies between the headwaters of the South Fork of Chalk Creek and Pomeroy Gulch, extending in a north and south direction nearly parallel with the main range of the Rocky Mountains, and about 3 miles distant from it. The headwaters of the Middle Fork of the South Arkansas River rise at its southern extremity. Almost if not entirely destitute of vegetation at this end, it rises so abruptly as to be almost inaccessible, and its summit is a succession of ragged rocks until within about a mile of the north end, where it descends gradually and is covered with a heavy growth of timber extending nearly to its summit. The general character of the formation is granite, but there is a small belt of porphyry crossing near its middle. A peculiarity of the mineral veins on this mountain is the fact that they hold their course continuously across the granite and porphyry without interruption by the change of formation, thus demonstrating their continuity.

The Pomeroy group of mines comprise the Mineral Point, Lily, Big Smoke, and Gold Stone.

The Mineral Point has a 195-foot tunnel on the vein 7 feet between walls; shows a pay streak a foot thick that is growing better as progress is made. Galena and gray copper are found, carrying, in addition to silver, from 1 to 2 ounces in gold.

On the Lily the development consists of a shaft 70 feet deep upon a vein 6 feet between walls, and the pay streak at the bottom of the shaft is 3 feet thick. The ore exhibits fine galena and gray copper, and there is a large quantity of it on the dump. Assays give a value of 365 ounces in silver, 60 per cent. in lead, and as high as 6 ounces in gold per ton.

The Big Smoke and Gold Stone make equally as good showing for the work done.

The Rarus and Warrior, located near the bottom of the hill, only a few hundred yards below the town of Hancock, are owned by the Rarus & Warrior Consolidated Mining Company, of which R. J. Coleman is the superintendent. Both locations are made upon one lode. The development consists of a drift on the vein 80 feet in length, with an incline shaft 50 feet in depth, sunk from the head of the drift. The ore-body is about three feet in width and increases as depth is attained. A great deal of native and wire silver has been discovered in the cavities of the quartz, and a large amount of ore is on hand awaiting shipment.

The Stanley property embraces five locations, viz, the Stanley and its extension, the Humboldt, also the Tom Ewing, Ben Butler, and Ben Franklin.

On the Stanley a tunnel was started 400 feet from the north end line and has been driven in over 400 feet. At the point where the tunnel is started the ground is much broken and quite flat, so that depth is not gained very rapidly. A shaft is being sunk further up the hill where the formation is solid, and the tunnel will have to be extended over 500 feet further to intersect this shaft. The pay here is the full width or the shaft, and an average of six assays on all the different kinds of ore gave a return of $75 per ton, but ranging from $23 to $315 per ton.

The Lone Star is located on the west side of Pomeroy Mountain, immediately south of the Stanley group. The mineral found in the new shaft was similar in character to the Stanley and Murphy ores, and mill runs over 100 ounces silver to the ton.

The Flora Bell, near Hancock, and a parallel vein to the Lone Star, is one of the very promising properties of Chalk Creek. The shaft at 85 feet shows over a foot of high-grade ore, carrying sulphides of silver, chlorides, and galena. An assay gave a return of 2,900 ounces silver per ton. This is on the same vein as the Allie Bell.

The Kentucky is located on Mineral ridge, or, as it is frequently called, Adair Mountain, about a mile above Hancock. Work was commenced under the management of Col. A. B. Steinberger, and a shaft was sunk from the hanging wall down until the foot wall was reached, a distance of between 70 and 80 feet. They were compelled to suspend operations for a short time until pumping machinery could be got in place. The engine and pumping apparatus belonging to the Lion mine were purchased and set up on the premises and operations resumed. The shaft was sunk along the foot wall for a distance of about 20 feet farther, and a cross-cut commenced to reach the hanging wall. After cutting through 35 feet of vein matter the hanging wall was reached. At 10 feet from the foot wall 1 foot of fine galena was encountered, at 18 feet another foot of mineral was reached, and at 22 feet a body of galena and quartz 7½ feet in thickness was encountered. Lying next to this large body of mineral was a streak of talc about a foot, and then 2 feet more of mineral, making, in all, a little over 11 feet of mineral. The ore is low grade in silver, but runs high in lead, and can be handled very profitably with a good concentrator, and after concentrating can be easily smelted.

On the Stonewall, located on the same vein, the workings are confined to the incline, which is now in 140 feet. At the depth of 100 feet a vein 28 feet between walls was cut, and at 115 feet a large body of white spar, streaked with galena, and carrying 3 ounces in gold, was opened. The mineral is mainly argentiferous galena running high in silver, though a great deal of white quartz and galena, bearing gray copper is found. The average value of the ore throughout by mill tests is $46. Large shaft-houses have been erected, and a 15 horse-power engine and pumping apparatus are in position and at work.

The Patten, above the Stonewall, has a 4-foot crevice between walls, which are gradually widening out as depth is gained. The ore is galena, very similar to that character of ore in the Stonewall, and runs 50 ounces in silver, half an ounce in gold, and a heavy per cent. in lead. The owners will drive a tunnel of 500 feet to tap this vein.

The Pride of Mineral Hill is a parallel vein to the Stonewall, and a shaft has been sunk 30 feet, showing a 3-foot crevice and an 18-inch pay streak, assaying $27 in gold and 30 ounces in silver to the ton.

The Chrysolite tunnel has been projected to cut ten lodes on Chrysolite Mountain, the principal of which are the Maid of the Mist, Jim Anderson, Ute, and Baalbeck.

The Pride of Norway has been exploited by a tunnel 225 feet in length. At 135 feet from the mouth of this tunnel the vein showed 9 feet of solid mineral, when a horse intervened and has just been passed. About 25 tons of high-grade mineral have been produced. It belongs to the Diamond Queen Company.

The Miller is the southern extension of the Pride of Norway vein, and is being developed by a shaft now about 50 feet deep. The vein is an immense fissure, containing a large body of mineral, which is yet of low grade. The character of the vein matter and the repute of other mines in its vicinity are the encouraging features which urge the owners to thoroughly explore this property, which in its outcrop and general appearance bears a striking resemblance to the Murphy group and the Mollie, lying a mile beyond in the direction of the general trend of the Miller vein. From each side of the mountain cross-cuts can quickly reach the vein to open the property in systematic shape.

On the north end of the mountain is the Elmora. The main workings are but 300 feet above the South Park Railroad depot. A broad working shaft is being pushed down upon the vein under a contract for 70 feet of depth. The vein crops out boldly to a width of 30 feet at the shaft, and the whole mass is quartz impregnated with iron and galena streaks.

The Tickler is on the west side of the same mountain. An 85-foot shaft on the vein is in mineral all the way down the full size of the shaft. The foot wall is well defined, and a cave occurring in the shaft did not reveal the hanging wall. The croppings show the vein to be at least 8 feet between walls. The ore is of milling grade in bulk, carrying nearly an ounce in gold, 50 ounces in silver, and 40 per cent. in lead. Two 10-foot shafts show the vein to be continuous in direction, and also in grade of ore. The vein is considerably decomposed, and the lead is in a carbonate form, the only case of the kind in this part of the district. The Chrysolite tunnel would cut this vein at a depth of 400 feet.

In Baldwin Gulch, between Boulder and Anteros Mountains, the White Mountain tunnel is being run to cut the White Mountain and Lincoln lodes, the surface croppings of which show a fine quality of galena assaying from 75 to 100 ounces to the ton.

The Sitting Bull, on the west side of the gulch, has bold outcroppings which can be traced on the surface for a distance of 6,000 feet. The main vein of the Sitting Bull has a 15-foot prospect shaft only, but its further development will be attained through a tunnel, on a spur vein which is now in 175 feet. This tunnel has yielded a large quantity of galena ore from a streak 6 inches to 2 feet in width, which is piled up about the mouth of the tunnel. After the tunnel has an additional 25 feet of length, a cross-cut will be run to cut the main vein, which is only 30 feet distant. Depth will then be gained very rapidly. The shaft shows the streaks of pay aggregating 2½ feet of 30 to 65 ounces silver ore, carrying 50 to 70 per cent. lead.

The Jewell is the northern extension of the Sitting Bull, and the Silver Chain and U. S. Treasury the southern extensions. Only assessment work has been done upon these claims.

The Oro lies west of and parallel to the Sitting Bull, and two annual assessments have been worked on the vein, which is 4 feet between walls encasing a fine body of galena ore.

The Rising Sun east of the same mine carries a pay streak of galena 18 to 20 inches wide.

On the east side of Boulder Mountain the Boss Tweed is a 7-foot vein, carrying mineral that samples 32 ounces throughout its entire width.

In Deer Cañon, between Boulder and Mammæ Mountains, is the Grant tunnel, projected by the Columbus and Sun Prairie Mining Company to cut seven locations on Mammæ Mountain.

The Anteros Tunnel Company own six claims further up the cañon.

The mines of Mammæ Mountain can be more advantageously operated by tunnels than by individual shafts or drifts, owing to the exceedingly precipitous character of the mountain.

The Silver Queen on this mountain has a 212-foot drift on the vein, and a cross-cut tunnel 80 feet below first level cut the vein at 57 feet, when a second level was run 106 feet on the vein. There are 18 inches to 2 feet of talc on the foot wall, carrying 18 ounces of silver and 20 per cent. in lead. Next come 16 inches of carbonate sand, which milled at Pueblo 67 ounces silver in a 5-ton lot, and then 1 foot of cube galena. The talc in the upper level is white, and in the lower, of a bluish cast.

The Schuyler group, on the western slope of Mammæ Mountain, 4 miles south of Saint Elmo and half a mile above the lake, in Grizzly Gulch, consists of ten mining claims, lying parallel to each other, all of which can be developed by a cross-cut tunnel, which is now in 225 feet. There is also a drift of 70 feet on the Silver King, the first vein cut, at a distance of 92 feet from the tunnel's mouth. This vein has improved rapidly, showing an 8-inch streak of white quartz, carrying fine galena and white iron, which indicates the close proximity of a heavier body of pay mineral. Thirty veins of mineralized quartz outcrop for a long distance on the ten locations held by this company, two of them being fully 30 feet in width, and one of them over 50 feet wide.

On Sugar Loaf Mountain the Clifton has four well-defined veins, from 4 to 6 feet wide, extending the entire length of the claim. A drift has been run in on the third vein 120 feet, and about 20 tons of ore have been taken out. No mill run has been made, but assays of the different specimens of ore show from 20 to 280 ounces of silver and one-half to one ounce of gold. A cross-cut tunnel is also being driven 180 feet below the above-mentioned level, which is now in 75 feet and just struck the first or lower vein. This will be continued, cutting all the veins from 70 to 120 feet below the surface of the ground, and from this tunnel levels will be run each way on all the veins. A cross-cut will also be run from the upper level to cut the extreme upper or fourth vein, and levels run each way on it, thus giving the opportunity to run six levels and insuring a large output of ore. A tramway is to be constructed 1,750 feet long to carry ore from the tunnel to the foot of the hill.

The Jennie is below and parallel with the Clifton. On this one location four parallel lodes crop to the surface, and none of them are less than 12 feet in width, while one is 40 feet across at the surface. Assessment work has annually been done on the croppings, but now a cross-cut tunnel has been started down the hill to tap the entire group in succession at great depth. This tunnel has progressed 250 feet, and cut the first vein at 85 feet below the surface. Levels will be pushed out each way on each vein as they are struck, and the ore passed to the surface through the tunnel. The first vein carries galena, gray copper, and iron pyrites, and assays 86 ounces in silver in bulk, with a high per cent. in copper.

Monarch district is located south of Chalk Creek. All the best mines of the district are situated within 2 or 3 miles of Garfield post-office, or Junction City, at the junction of the South, Middle, and Lake Forks of the South Arkansas River.

The Monarch mine is located on Monarch Mountain, on the South Fork of the Arkansas River, about 7 miles above Maysville, and is owned by the Great Monarch Mining Company. The mine was discovered several years ago, and has produced considerable high-grade ore.

During the past year it has been involved in litigation, but the company is now in full and undisputed possession, and propose to work the property vigorously. The mine is located on a true fissure vein that varies in width from 18 inches to 5 feet. The developments consist of two inclines, 135 and 150 feet in depth, and a tunnel from which a cross-cut has been run 100 feet. A shaft has also been sunk on the vein, from which an upraise has been made about 75 feet, and from this upraise all the ore thus far shipped has been taken. The ore is high grade, and there are now about 25 tons awaiting shipment.

No work is being done at present on the Little Charm, adjoining the Monarch, but as the same character of ore has been developed that is found in the Monarch, it is probable that work on the property will be resumed in the spring.

On the Silent Friend a shaft had been sunk 82 feet, and no mineral struck. A cut was started 30 feet above near the surface, and a vein was uncovered 16 feet in width. This was followed 30 feet, and promises to be one of the best strikes in Monarch Mountain. It carries 59 per cent. lead, and the lowest assay in silver is 16 ounces. At a depth of 30 feet an assay gave 42 ounces.

The Madonna Company own the Madonna and Cherubim.

On the Madonna and near the south-end line is shaft No. 1, which is sunk to a depth of 115 feet. At the depth of 47 feet the ore-body was reached. At this point drifts were run in various directions, making the total workings 300 feet, all through mineral. From this point down 68 feet farther this shaft is in mineral. At the bottom of the shaft are several drifts, one running south 80 feet parallel with the vein, all through mineral of a very fine quality. Another drift from bottom of shaft runs west through mineral 40 feet, when the west wall was reached, consisting of Silurian lime mixed with some porphyry. The east wall has not yet been reached, and in the entire workings the west wall, wherever found, is of the character as above stated. At head of 40-foot drift a cross-cut is run west 13 feet.

Shaft No. 2 is down 80 feet, and several hundred feet north of shaft No. 1. No mineral was found in this shaft, as the vein was missed, which is proven by the fact that a cross-cut was run from the bottom east 40 feet and after drifting 8 feet mineral was struck which continued to head off this drift. At the head of this drift the ore-body changed and became mixed with porphyry—an indication that the east wall, when reached, will be porphyry.

The tunnel has been driven to a depth of 340 feet, and is being pushed at the rate of 6 to 8 feet per day. The dimensions of the tunnel are 6 feet high, 5 feet wide at the bottom, and 4 feet at the top. The mouth of the tunnel is 175 feet from the bottom of No. 2 shaft, and is driven in a southerly direction and in line with the two shafts. At the point where the tunnel intersects with shaft No. 2, a cross-cut was run west 40 feet through lime, but no mineral found. The east wall was not reached at head of cross-cut running east 40 feet, as noted above.

The ore is galena, lead and sand carbonates, the carbonates largely predominating. It is a low-grade ore, and will give average mill returns at a very low estimate of $20 per ton, The company have a 40-ton smelter, the ore from the mine being delivered by a cable tramway.

The Eclipse, adjoining the property of the Madonna Company, has run a tunnel to tap the ore-body about 250 feet below the upper workings, and about 15 tons of ore have been taken out in driving the tunnel. The main shaft, now at a depth of about 185 feet, also shows a good ore in the bottom. The ore-bodies previously developed on the 45-foot level are still untouched. The Madonna and Eclipse mines are building a wagon-road from the smelter, by way of the beaver dams, to the mine.

The Columbus mine, at present developments, is one of the most valuable mines in Monarch district. It has not so large a body of ore in sight as the Madonna, but it is of better grade and can be worked more cheaply, it being milling ore. This mine lies nearly a mile above and back of the town of Columbus, on the Middle Fork of the South Arkansas, a mile and a half above Garfield. The mill and offices of the company owning it are in the town, and connected with the mine by a wire-rope tramway, 4,605 feet in length. By this, 100 buckets, carrying from 120 to 150 pounds of ore, according to the quality, come down from the mine to the mill and are returned empty on the other side.

The principal development work on the mine consists of two tunnels on the vein. The upper one is run 500 feet with a continuous ore-body, and the other, 60 feet lower, is in 560 feet, also in solid ore. The two are connected at points 150 and 500 feet in, by winzes. The depth below the surface at the back of the lower tunnel is 360 feet. At a distance of about 400 feet on both tunnels there is a change in the character of the ore, the outside having been to some extent oxidized and leached by the action of the elements. The silver in both classes is found as a sulphuret, with some chloride, and the average value of the two ores does not vary materially. There has been very little stoping done, most of the ore having been taken from the tunnels. The ore will average $40 per ton; some of it is high grade. A considerable amount, taken out in 1880, ran 1,200 ounces in silver. The ore which has been shipped all ran over 50 ounces. The facilities for handling and treating the ore enable the owners to mine and mill $10 ore at a profit. The company had a 10-stamp mill, which was destroyed by fire. A new mill of 20 stamps, with a capacity for 20 more, has been built. It is equipped with a Blake crusher, eight pans, four settlers, a drying and a roasting furnace.

Other prominent properties of the district are the Fairplay, Paymaster, Charm, Lexington, Ben Bolt, Oshkosh, and Elkington.

Emerson Camp is 6 miles northwest of Maysville. It is in the same mineral belt as the Monarch camp, and to a great extent has the same quality of ore. Some of the most prominent and best-known properties are the Eagle Bird, Rainbow, Song Bird, High Point, Indianapolis, Last Chance, Ben Hill, Bonnie Belle, Mountain Chief, Pinafore, Eagle Bird No. 2, and North Missouri.

The Eagle Bird is developed by a 40-foot shaft, well timbered and in good shape. The vein at the bottom of the shaft is 3 feet wide—all ore that assays from 15 to 1,069 ounces in silver. In sinking 40 feet about 25 tons of pay ore have been taken out, most of which has been shipped away, giving at the smelter returns of from 40 to 50 ounces silver per ton.

The Rainbow is an extension of the Eagle Bird, but the ore is of a very different character, being almost entirely a lead ore. This property is developed by two shafts, one being 60 feet deep and one 20 feet. Owing to the bad shape in which the work was done in the deeper shaft, that has been abandoned, and the work is now being done on the 20-foot shaft. Most of the ore taken out is now on the dump, although a few tons have been shipped. The ore yields mill returns of 40 ounces silver and 42 per cent. lead per ton, but assays as high as 145 ounces silver per ton have been taken from the vein

On the North Missouri the shaft is now 115 feet deep, showing a vein 5 feet wide. Ore from this mine assays from 30 to 290 ounces of silver.

The production of the county during 1882 was approximately $45,000 in gold and $100,000 in silver.

CLEAR CREEK COUNTY.

Clear Creek County contains vast bodies of gold and silver bearing ores. Indeed, the entire county beyond the foot-hills is one continuous mining district, extending from Gilpin and Jefferson Counties on the north to the boundaries of the county on the south and west. The mines are of two classes: first, the gold mines, in which the ore is usually iron and copper pyrites in a siliceous gangue, with zincblende and galena; second, the silver mines, in which the chief minerals are galena and gray copper, with pyrites, ruby, brittle and native silver, and silver glance.

The ores containing gold generally carry a small portion of silver, and the silver ores contain gold. The country rock is chiefly granite, with porphyry and mica schist. The total yield of the county since the opening of the mines in 1859 to December 31, 1882, is estimated to have been $26,000,000, and for the last ten years to have been annually about $2,000,000.

The leading mining districts are the West Argentine, Griffiths, and Idaho Springs, and the principal mining centers are Silver Plume, Georgetown, Empire, Dumont, and Idaho Springs. The original silver discoveries of Colorado were made near Georgetown; and in the mountains encompassing and extending back of that place up to the main range are numerous fissures filled with argentiferous ores. The mountainous and broken nature of this mining region offers unusual opportunities for intersecting and following the veins by means of tunnels and adits, consequently a greater number of tunnels and levels have been opened and worked than in any other portion of the State; some have been run over 2,000 feet, and others projected on a gigantic scale to penetrate and discover the hidden treasures contained in the interior of the mountain peaks, or to cut through mountain chains that separate the waters flowing to the Atlantic from those emptying into the Pacific.

The gold districts of the county are mostly in the vicinity of Idaho Springs. Several mines, heretofore the heaviest producers, have been partially or altogether inactive during the year. The Stevens, which in 1881 yielded $60,000, was not worked; the Hukill fell off $60,000; the Freeland was not running until the 15th of June, and since then employs but one shift. The falling off in the production of these three mines was over $255,000; this has in part been compensated by the opening up of new mines, but the production for the past year is considerably less than in the year preceding. The Colorado Miner claims the production of the county in 1882 to have been $2,001,629.33.

The Georgetown Courier, of January 4, 1883, publishes the following statement as the production of Clear Creek County:

CLEAR CREEK COUNTY'S OUTPUT.

Ore bought by—	
Boston and Colorado Smelting Company	$558,000 00
Golden Smelting Works	319,854 57
Miners' Smelting Works	340,769 00
Moore Smelting Works	235,730 75
Grant Smelting Works	3,200 00
Pueblo Smelting Works	
Omaha Smelting Works	

Ore bought by—	
Mathews & Co	
Central City mills, from Seaton Mountain and York district, and included in Gilpin County returns, about	$150,000 00
Dumont Smelter	148,000 00
Ore from Geneva district, included in Park County returns, about	7,000 00
Gold bought by—	
Bank of Idaho Springs	6,827 60
Georgetown banks	
Central City banks, from Alice placer, about	6,000 00
Central City banks, from other placers	
Free gold at Dumont, Albro, and Mansfield mills, about	10,000 00

My estimate of the production of the county during the year 1882 is of gold, $1,680,000, and of silver $220,000, a total of $1,900,000.

Geneva district is in the southwestern part of the county, and is so called from the creek of that name, on the headwaters of which it is located. The production of gold and silver in the district for the year is claimed to be $7,000.

Argentine district is farther north, and west of Geneva district. The Independence, at East Argentine, is a silver mine, owned by O. E. Clarke, and has been successfully operated by different lessees. Several shipments of ore are reported, yielding from 100 to 200 ounces of silver to the ton, and the mine is of sufficient value to pay the expenses of the lessees in developing it. The last lessees employed for a portion of the time a force of 6 men.

The Harris & Bond group, composed of five mines, viz: the Mint, Mint Extension, Pocahontas, Tornado, and Coach Whip, is located in this mining district, about 8 miles from Georgetown, and near McClellan's Mountain.

The Mint is an old location which was abandoned several years ago and relocated by the present owners. It is developed by a shaft down 100 feet and by an adit upon the vein, which is said to be from 6 to 10 feet in width, with a pay streak 4 to 6 inches; the ores are a hard sulphuret, mixed with galena.

The Coach Whip is developed by a shaft down 70 feet and a tunnel of 73 feet.

Below Gray's Peak, at the head of Harris Gulch, the Silver Ledge Company own the Silver Ledge mine, in which a force of 15 men were employed during a portion of the year extending its three levels, in all of which ore has been found, chiefly galena and iron pyrites. The total distance driven in the levels was nearly 500 feet.

The Kelso Mountain United Tunnel has progressed 380 feet, and intersected the Wooten and Cross-cut lodes. It is to be extended through, and has crossed successively the Oro Bell, Silver Glance, Mamie, Snow Drift, and White Quail.

The Atlantic and Pacific tunnel has been steadily worked by a force averaging 15 men, and has been driven over 600 feet during the year, the total extension being, on the 1st of January, about 1,300 feet. The tunnel, when in about 900 feet, intersected the Great West lode, upon which was found a regular vein of 300 ounce ore from 3 to 4 inches thick. This lode is an extension of the Diamond lode, formerly known as the Brooklyn. The tunnel was commenced in 1880, with the design of piercing the Rocky Mountain divide and running a distance of 25,500 feet, nearly 5 miles. The east end of the tunnel was commenced at the foot of Kelso Mountain, 60 miles due west of Denver, and passes nearly under the center of Gray's Peak at a point 3,425 feet below the surface. It has been extended over 1,500 feet. It is 8 feet high by 10 feet wide. Except from a few feet from the commencement of the tunnel no timber is required in the work, which is being done under contract and with first-class machinery. A steam-engine has been placed at the mouth of the tunnel and the power communicated to Ingersoll drills, which are driven by air-compressors. The Colorado Central Railroad passes within two or three miles of the eastern mouth of the tunnel and crosses the divide near Loveland Pass. The company has a number of veins which they anticipate they will cut with the tunnel, besides blind lodes.

One of the most important mines in Clear Creek County is the Seven-Thirty, in Brown's Gulch, near Brown Mountain, about 4 miles from Georgetown, N. M. Griffin owner. It is claimed to be located on a vein between walls of granite and porphyry. A force averaging about 50 men were at work during the year extracting and shipping ore, and engaged in further developing the locations belonging to the group known by that name, which cover the main fissure for a distance of a mile, and a surface area of 34 acres. The principal operations are carried forward through the Hercules tunnel. The main shaft, on which had been placed a small hoisting engine, was sunk 100 feet, and two levels extended, the one a distance of 600 feet and the other 250 feet. The mine is now opened up over 6,000 feet, with hundreds of feet of shafts and winzes. The Courier says the total production of the mine can only be roughly estimated, but from the most reliable information is not less than half a million dollars. The mine has always produced ore of a high grade.

The Telephone, in the same locality, is owned by Cambden & Merrick, who report it to be a true fissure vein, containing argentiferous galena and sulphuret of silver. The mine has been worked by a small force of lessees, and several shipments have been made of ore for milling, and the returns amounted, as stated in the Courier, to $3,000.

The Bismarck, on Brown Mountain, G. A. Cooke manager, is reported to be a fissure vein containing galena and zincblende. The mine was worked through a cross-cut tunnel 175 feet in length, and by drifts running 200 feet east. Four men have been employed upon the drifts taking out and preparing ore for the mill.

The Shivelly mine has been steadily worked by a force averaging 15 men. The main shaft was sunk 70 feet and 400 feet of levels driven. The general condition of the mine is equal to what it was in the previous year.

The Silver Leaf lode is situated some distance above the Shivelly, and has been leased. It has been producing a rich smelting ore.

The Dunderberg is the principal mine on Sherman Mountain; is located about 3 miles from Georgetown, and owned by the Dunderberg Mining Company, R. O. Old president and secretary. The mine was located in 1868, and has always been a large producer of bullion, and was at its best about five years ago. Its production in 1881 was at the rate of $12,000 per month. It employed 125 men at the beginning of the year 1882. Its ore is galena, gray copper, and ruby silver. The mine is pockety, and therefore has varied in its proceeds, some months being profitable to its owners, and in others its expenditures exceeded its receipts. It is systematically developed by several shafts and drifts and tunnels, and has 400 feet of levels, 100 feet of winzes, and 40 feet of cross-cuts. It has a fine concentrating mill (operated by what is called the "Hartz process"), with five jigs, a Blake crusher, Cornish rollers, &c. The Georgetown Courier states that it has been worked during the year by lessees with an average force of 45 men, who have taken out about $70,000.

On the same mountain are the Frostberg, Mendota, East Mendota, and West Mendota, all owned by R. O. Old. Their ores are galena, intermixed with zincblende and copper pyrites, with occasionally gray copper and brittle and ruby silver.

The production by the Mendota and its extensions has been quite large, and especially so considering the fact that the ore is necessarily brought down from the mountains by jacks or hauled in wagons to be delivered at the mill or shipped away for treatment. The mines are worked by lessees, and each employs from four to six men. In the West Mendota the lessees, in sinking a shaft 20 feet and a drift 300 feet on the vein, employed a force of five men in taking out 572,035 pounds of ore, worth $13,644.83, without lessening the visible reserve of ore.

The Colorado United Mining Company have continued to employ a large number of men, amounting in the early part of the season to 200, including contractors, lessees, and day men.

The main shaft on the Terrible was sunk during the season at the rate of 10 feet a week by a force of twelve men, divided into three shifts. The shaft is down over 900 feet.

In the immediate vicinity of the Silver Plume are the Baxter, Lost Cause, and the Little Mack. The Baxter, John G. Roberts superintendent, has been worked by lessees, and employed a force of 10 men. They have extended the 160-foot level 300 feet, and taken out considerable ore, which has paid well.

The Lost Cause is being intersected by a drift constructed on the Emma Dennison.

The Little Mack has its tunnel advanced 120 feet, and a test of the value of the ore returned from 38 to 106 ounces silver and between 50 and 60 per cent. lead to the ton.

On Republican Mountain, in the same mining district, are the Vulcan, Pay Rock, Sterling, and several others.

The Vulcan has been regularly producing for the last two years, and a statement lately published makes the value of its production over $41,976, from 132 tons of ore—an average of $318 to the ton. It is worked by a force averaging 3 men. The lower level was extended 200 feet, and the upper one 100 feet.

The Egan tunnel has been extended 350 feet to the Vulcan shaft, at a point 300 feet below the surface. The drifts have been extended northeast 300 feet into paying ore. A blacksmith shop and ore-house have been built, and the mine is in fine condition for future operations.

Above the Vulcan mine are several locations, among them the Elm City, which in sinking its shaft 60 feet, and running drifts not exceeding 30 feet took out $20,000.

The Sterling, above the Vulcan, is an old mine, noted in former years for its high-grade ores. From 10 to 15 men were employed in opening up the mine at different points, and between July and January cleaned up and retimbered two shafts, the one from a depth of 75 feet, and the other 125 feet, besides sinking 60 feet deeper in the mine, and accomplished 680 feet of drifting. The mines belong to the Lebanon Tunnel Company, and have been worked with a force averaging 140 men, and have taken out considerable ore.

The Heis mine was cut by the tunnel in the commencement of the year, and has since been opened by a level 240 feet long, and two shafts of 20 feet in depth.

The Dunedin is above the Lebanon Company's property, and is owned by R. O. Old. It has been worked by lessees, and produced, according to the Georgetown Courier, 15,484 pounds of ore, of the value of $787.73. The ore is argentiferous galena, intermixed with some zincblende, iron, and copper pyrites.

The Pay Rock Consolidated Mining Company, J. M. Egan manager, own several valuable mines, all apparently centering into one, and forming the Corry City lode. The company have sunk 2,500 feet of levels, and employed a force of 65 men. According to the Courier, they have taken out $63,000 worth of ore, without lessening the ore reserves. The Old Silver Plume mill is being repaired for concentrating ores for the company. The old 70-foot water-wheel is to be taken out, and a new 20-foot one substituted, which will afford ample power and be less wasteful of water. It is expected the mill will be in running order by spring, and be able to treat ores at the rate of 20 tons of ore per every ten hours, less than $1 per ton cartage excepted.

The Diamond Tunnel Gold and Silver Mining Company own properties about half a mile from Georgetown, and have been engaged in running a tunnel to intersect the Corry City lode, which they have accomplished. The mines of this company are situated on Sherman and Republican Mountains, near Silver Plume. During the year the tunnel was driven 345 feet, and nearly 400 feet of shafts were sunk; 36 fathoms of stoping out has been done, and 832 feet of levels opened. The total amount of development on the main tunnel is 2,129 feet.

The Corry City has 240 feet of levels, 2,260 feet of shafting, and 1,056 feet of stoping. The expenses have been quite heavy, amounting in some months to $3,000, but several shipments are reported of first and second class ore, from which the company paid its expenses for the month of October. The ore runs from 20 to 82 ounces of silver.

The Pelican Dives is a valuable and productive mine lying west of the Diamond tunnel, to the level of which its shaft is connected. J. M. Sayles, cashier, reports that the ore is an argentiferous galena. The mine has been worked under lessees by a force of 80 to 100 men, and is reported to have taken out sufficient ore to pay for the labor. The main shaft was sunk 100 feet, and is down 1,000 feet. The mine is opened by several levels, drift and surface tunnels. The company has built a new ore-house 30 by 50 feet, and 4 new cars for the use of the mine, and put in new pumps and machinery. The mine is much improved, and is in better condition than during the previous year.

On Griffiths Mountain the principal mines are the Ætna and Hood.

The Ætna is an old location made in 1867, and is about one mile from Georgetown. But little work was done on the mine until the present owners commenced six drifts, or adits, one above the other, about 70 feet apart; the adits are now in 120 feet. The vein is gold and silver, and is 20 feet in width in some places, and contains galena and sulphuret ore, running from 35 to 300 ounces to the ton.

The Hood shows a 2-foot vein of ore which is reached by an adit of 300 feet in length. One mill run returned 8 ounces of gold and 113 ounces of silver to the ton, carrying 15 per cent. of copper, but of late the ore has contained more galena and less iron and copper.

On Columbian Mountain are the Plebeian, Liberty, Kohinoor, and Joe Reynolds.

The Liberty has been worked throughout the year by a small force, and has 330 feet of drifts, and a depth of 125 feet in the shaft. The mine has assumed increased proportions as an ore producer, and a force of 5 men has been employed by the lessees in extending the main adit and extracting ore for the mill.

The Kohinoor has been worked by lessees, and 10 men have been employed in extracting ore. Its shaft has been sunk 222 feet from the tunnel level, and some drifting has been done.

The Joe Reynold mines (near Lawson) have been extensively worked.

The developments consist of three levels, and one cross-cut of 250 feet in length, which cuts the main vein about 150 feet from the surface. The drift 800 feet on the vein is called the O'Connor level. This level has been stoped out one-third of the distance 65 feet above, and has produced more than $200,000. Below the level is 350 feet in length, and in stoping out one-fifth of the distance produced $140,000.

The Discovery tunnel is about 530 feet long, about 60 feet of which has been stoped out. This mine has produced $30,000. The production given is taken from published statements.

The Wide West mine has been profitably worked by W. F. Floyd, lessee. The shaft is 30 feet deep, and there are 550 feet of levels.

In the vicinity of Empire several mines have been worked during the year.

The Murphy has steadily employed a force of 5 men.

The drift on the Empire City lode has been pushed to a distance of 300 feet, on a vein of ore from 6 inches to a foot thick, carrying from 2½ to 5 ounces of gold to the ton; some of the ore contains iron pyrites, and is not rich enough in gold to pay the railroad and smelting charges, and the ore is roasted and worked in an arrastra.

North of the Empire is the Gold Dirt lode, which has been leased and worked by the proprietors of the Bancroft Carter mill, for the purpose of supplying the mill with ore. This mill ships its amalgam to Denver.

At Silver Dale, on Independence Mountain, is the Aliunde tunnel. The company own several lodes. The Aliunde tunnel No. 2 is the west extension of the Colorado Central; the mine is located on a 2-foot vein of ore carrying silver polybasite. On account of the water it has been found necessary to put up new pumps run by water-power; the vein of the Aliunde has been traced farther west to the Little Jack lode.

Dumont, formerly known as Mill City, is on Clear Creek, between Georgetown and Lawson, and is quite a mining center. Two stamp mills, the Albro and the Mansfield, are located here; and fifty-three different mines within a radius of 2 miles have produced more or less gold and silver ore during 1882. The gold ores are worked in stamp mills at that place and the silver ores are sent to Georgetown for treatment. The most prominent mines are the Albro, Eagle, American Eagle, Ohio, and Syndicate.

The Albro is one of the oldest mines in the county, having been discovered in 1859; its vein can be traced for nearly 2 miles. The mine has kept a force of 45 men at work and made some shipments of ore during May and June, at the rate of about a car load per week to Argo or Golden; one car load of ore was sent to the Miners' Sampling Works, and is reported to have produced $2,282.45. The first-class ore contains gold 17.43 ounces, silver 36½ ounces, and copper 12½ per cent.; the second-class ore contains gold 10.83, silver 18½, and copper 5½ per cent. The net result from operating mill and shipping smelting ores for a period of twenty-eight days, 4 men being employed, was reported to have been $2,341. The mine is said to be a true fissure vein now open 3,000 feet.

On the Ohio 9 men have been at work, in 8-hour shifts.

The Commonwealth is situated a short distance above the Ohio, and is now worked by parties holding a lease and bond. Its ore runs high.

The Syndicate has pushed its drift 400 feet and run its level east from the main shaft near the apex of the hill. One mill run of the smelting ore is reported to have returned $45 per ton.

Several good mines are located on Democrat Mountain.

The Reliance, an extension of the Matilda Fletcher, has struck a vein of decomposed ore about 6 inches thick in sinking its shaft a short distance from the surface.

The Matilda Fletcher has been worked on three different levels by different lessees. A lot of ore from the level, weighing 9¾ tons, extracted during the month of August, by 6 men, netted $1,936.40; the same force extracted during the previous month ore netting $2,332.65.

The Rodgers mine, on the same mountain, produced in July, with a force of 4 men, ore of the net value of $2,000.

The Silver Glance found considerable trouble from abundance of water in the mine; its main tunnel is in over 400 feet.

Some work was done on the King Solomon, the west extension of the Silver Glance. It is opened by two shafts for a depth of 44 feet.

The Little Emma struck paying ore in July, the first since the tunnel was commenced, which it is stated will be in sufficient quantities to pay the expense of driving the tunnel.

The Fred Rodgers has been worked under lease, and 230 feet of drift on the lode has been made, two men being employed.

The Moline tunnel is in the gulch below the Muscovite, and two shifts of men were employed, who are using Ingersoll drills run by steam-power. Progress has been made from 80 to 85 feet per month, and the tunnel, which is 8 feet square and perfectly straight, is in about 500 feet. The tunnel is projected to pass through the mountain, and it is expected will cut 32 lodes. A force of 9 men is employed.

The Polar Star, one of the old mines on this mountain, was leased and bonded, and work resumed in the latter part of the year.

On Leavenworth Mountain are several prominent mines, among which are the Wide West, Colorado Central, Welch, and Equator.

The Wide West was worked until August by a force averaging from 12 to 15 men, who were engaged in developing the mine by driving adits and sinking winzes; it is claimed that large ore reserves are visible, estimated by Prof. J. Allen Smith to be worth $260,000 to $300,000.

The Colorado Central is reported to have produced a larger amount of silver in 1882 than any other mine in Clear Creek County; it has worked a force of 75 men; 2,000 feet of levels have been run and 500 feet of cross-cuts have been driven; 82 feet of shafts and 20 feet of winzes have been sunk. The production of the mine is reported to have been $9,000 per month.

The Hillside Mining Company own the Leavnworth tunnel mine, which lies parallel with the Wide West; it has been opened by an adit 600 feet in length.

The Rocky Mountain tunnel, in drifting 100 feet west of the point where the Montezuma lode is intersected, struck a vein of gray copper and silver ore.

The Isothermal is on Leavenworth Mountain, above Silver Plume; has driven its tunnel through hard rock to reach its vein, which is said to be unusually rich and wide.

From the Seco and McClellan mines on the same mountain small quantities of ore were taken out and milled. The Seco was worked by lessees.

The Equator, owned by the mining and smelting company of that name, is located near Georgetown; its ore is silver-bearing galena; the mine has been worked by lessees, and 12 men have been employed; they have taken out considerable ore, some of it being very rich, having milled 1,072 ounces of silver to the ton.

The Equitable, near Georgetown, is a silver mine under the management of W. M. Fletcher.

The Neath mine has been idle; its main shaft is 275 feet in depth, and upon it is located a 6 horse-power hoisting engine; it has a tunnel on the vein of 100 feet.

The Dubuque and the Dubuque Extension are located on Fall River, a short distance above its junction with Clear Creek. The former has a shaft of 60 feet, and the latter a shaft of 25 feet and an adit 61 feet; they are both owned by the same company, and have produced a small amount of ore.

The Grand Army has a shaft of 100 feet, and has employed 6 men in development work.

Near Fall River, on Hiawatha Mountain, is the Hiawatha, owned by the Hiawatha Gold and Silver Mining Company. It was opened several years ago by a tunnel 650 feet in length, but is now idle.

In the *Upper Fall River district* the Alice placer mine, near Silver City, had a successful season's work in sluicing off placer ground; they own two Little Giant hydraulics, and employed quite a force of men.

Camp Clifford.—At Camp Clifford, on Clifford Mountain, a mine known as the Maple Leaf mine has been opened, and its shaft sunk a depth of over 200 feet. This mine is supplied with the best improved machinery, which is planted on a rock foundation to prevent jarring or strain. The engine is a 20 horse-power, with improved Lidgerwood cylinder and hoister, and the parts are so constructed that one man has full control over the entire machinery.

The Clifford mine, the earliest discovery in this district, was located in 1879 by a miner, who, following down the outcropping of heavy spar, struck, at a depth of 96 feet, a large body of sulphuret ores. The mine has a 5-stamp mill for concentrating. Its shaft is down 100 feet, and it has about 1,000 feet of levels in the mine.

The Ranchman, immediately east of the Clifford and on the same vein, is owned by the same parties, and is considered a promising prospect.

The Vancouver was sold in April for $50,000. The purchaser continued sinking the main shaft, which is down over 150 feet, from which he has taken out and milled some ore of good quality.

Of the Yellow Jacket no information is at hand except that in May last it had everything in readiness to commence work upon the vein, but had obtained no machinery.

The U. P. R. lode has been worked, but its production has not been very large.

Idaho Springs district.—This is one of the most important mining centers in Clear Creek County, and is situated on the South Fork of Clear Creek, near its junction with Chicago Creek. Mr. Thomas H. Jones has furnished a list of the mines in this locality, or tributary to it, and a description of some of the more important ones.

Hukill mine, on Clear Creek, about 1½ miles west of town limits, has been extensively developed, and yielded a large amount of ore, but for some reason has lately been closed. In former years it paid regularly large dividends, but the ore-body at this time is from 4 to 5 feet thick. The main shaft is down about 500 feet, from the bottom of which is a drift running from both sides, all the way in continuous ore. This mine, were it systematically and economically managed, could be made a regular and good dividend-paying property; this is spoken advisedly from a full knowledge of its merits. Two very handsome specimens of erubescite ore, weighing about 1,500 pounds, from this mine, were on exhibition at the late Denver Exposition.

Fairmount, in Hukill Gulch, about 1½ miles northwest of the town, is being worked, under lease, by John Owen & Co., and is producing well, but to benefit the owners should be opened more extensively. This property has been badly managed—a great deal of useless work done—but with economical and proper development can be made a very valuable property. The ore-body is large, of good grade, and carries black oxide of copper, yellow copper, gray copper, free gold, and zinc. The free milling ore is being handled at the Trojan mill with good results.

Mayflower, on Clear Creek, just west of the town limits, lately purchased by G. A. Hobart and G. Burt, trustees for the bondholders, to satisfy whose claim it was sold, is one of the valuable mines of this camp. Extravagant and bad management on the part of the former superintendent forced its sale. This mine is developed by an adit 200 feet in length, a shaft on the mountain side about 170 feet deep, with shaft-house with hoisting rig over it, a shaft on the bar about 130 feet deep also having over it a plant of machinery; this shaft is very well timbered. A drift extends from this latter shaft 50 feet south, and another drift 80 feet north from the first designated shaft, leaving a space of about 70 feet between the two drifts to be opened and connection made. The vein is wide and carries a fair body of solid smelting ore, some of which runs very high, also a large body of concentrated ore. The minerals consist of gray copper, galena, native silver, zinc, and antimony. Work has just been commenced under the new management and will be vigorously pushed, and in another year the mine will add largely to the output of this district.

Idaho tunnel, one mile north of the town, owned by the Consolidated Seaton Mountain Mining Company, penetrates the south face of Seaton Mountain from low down on Boomerang Gulch. For the first 800 feet but slight depth is gained, as the surface rises from the face slightly, but from thence onward depth is rapidly gained. This extra extension of the tunnel had to be made in order to secure good dumping ground. Should the tunnel be constructed the full 3,000 feet as proposed, the extreme end will be about 1,500 feet under the surface. The company own a large number of valuable lodes on the mountain which it was intended this tunnel should cut for the double purpose of drainage and carrying out of the rock and ore, thereby saving great expense in hoisting through separate shafts. The company being unable to dispose of its stock and secure working funds, the tunnel has thus far been constructed only about 1,100 feet.

The only lode cut at depth, and being worked through the tunnel, is the Kangaroo, which is a very valuable property, and was a large producer of ore before being acquired by the company. It was cut at about 300 feet depth and is at the end of the tunnel. It is being worked by lessees. Here is a grand opportunity for the investment of capital to secure large returns. Should three or four good mines only be cut for the full length of the tunnel, then the company has ample mining property to give large dividends.

Metropolitan, on Seaton Mountain, about $1\frac{1}{4}$ miles north of town, has, from the surface, paid its own way and made its owners considerable money; the main working is an adit in about 400 feet, from which considerable stoping has been done; the smelting streak is of fair width, giving mill runs ranging from $60 to $600 to the ton. Minerals are gray copper, galena, free gold, native silver, pyrites of iron, and zinc blende. There is also a good streak of concentrating ore. Unfortunately this mine is now closed on account of litigation.

Kangaroo, on Seaton Mountain, has a shaft down about 180 feet, and several drifts. The vein has also been cut at about 300 feet from the surface, by the Idaho tunnel, at about 1,100 feet from its entrance.

This mine has produced considerable ore of good grade, and has been worked from the surface by lessees in a very indifferent manner. It is now being worked by them through the tunnel. Were an upraise made to the surface, giving ventilation, and a few thousand dollars spent in proper development, it could be made a productive and valuable property.

Tropic, C. Gillmore superintendent, 1½ miles north of Idaho Springs, on Seaton Mountain, which is one of the great mineral vaults of the Rocky Mountains, has two deep shafts; the main working, over which is machinery and a good working rig, is down about 325 feet, from which 4 drifts are run, ranging from 400 to 800 feet in length. This mine has very considerable merit, and has produced a large quantity of ore, consisting of gray copper, galena, sulphurets of silver and zinc, but it has not been systematically or economically worked; therefore is not in a very satisfactory condition. This property could be made very valuable by having about $10,000 expended in development. It is worked now by lessees.

Queen, on Seaton Mountain, in the same vicinity, has been worked from the very surface by lessees, many of whom have had large returns therefrom, but they have left the mine in a bad condition. Here is an opportunity for capital to secure remuneration.

Hub, on Seaton Mountain, near the Queen, has two adits, and one main working shaft down about 200 feet, and from which run two drifts. It has produced considerable fair grade smelting and concentrating ore, consisting of gray copper, pyrites of iron, galena, and zinc blende, but the mine has been badly worked by lessees. With proper development it could be made to yield large returns.

The Seaton, from which in old times large quantities of ore were extracted, will shortly be cut through by the Foxhall tunnel, which is being driven into the mountain from Seaton Gulch.

Little Casino, on Seaton Mountain, 1½ miles north of the town, is being rapidly developed by Wilson & Hall, its enterprising owners. They have a fine plant of machinery, and are doing all possible to make their property productive and valuable. Thus far no stoping has been done, but the ore coming from the shaft and drifts has given good mill runs. The minerals consist of gray copper, galena, sulphurets of silver, free gold, and zinc. The ore chute extends from the surface down.

Veto is on Seaton Mountain, about a half mile further north. Main shaft runs down about 500 feet, from which run a number of drifts. This mine has produced largely of ore, some of it very rich in high-grade gray copper. It has been worked from the surface by lessees, whose sole object has been to make the most out of it with the least possible outlay. With fair development it has in it the making of a remunerative property. It has been worked by a force of men averaging 8 or 10.

Little Mattie, situated on a small gulch running into Chicago Creek, about 1½ miles southwest from town, is being rapidly and substantially developed under the efficient management of Maj. J. V. W. Vanderburg. The ore-body is wide, continuous, and quite rich, and, should it so continue, will ere long make one of the leading mines of the county and possibly of the State. The working shaft is down about 200 feet and still being deepened. Several drifts run therefrom, the largest over 200 feet in length. The ore carries gray copper, zinc, galena, ruby, brittle, and native silver, and silver glance. The sulphides, of which there is an immense body, are well adapted for concentration. At the Denver Exposition eleven specimens of ore, taken from different portions of the mine at different dates, were exhibited. Portions of each were assayed and gave an average value of $1,384.96 to the ton, the lowest being $376 and the highest $5,098.16.

Kitty Clyde, on Spring Gulch of Chicago Creek, 3 miles southwest of town, owned by Warren & Co., has a continuous body of ore, from the surface to the bottom of the main working shaft, now down about 180 feet, and the ore taken out from the drifts running from it is of good grade. The developments are being pushed vigorously, and already there is a large quantity of ore ready for stoping. Two sets of men were employed at sinking its shaft, which is down 150 feet.

Freeland, 4 miles west of Idaho Springs, on Trail Creek, has 3 adits, the longest, 2,200 feet, being the lowest; a shaft down 750 feet and still being deepened, and two drifts, at 125 and 250 feet respectively below the lowest level, running from both sides of shaft, are being vigorously driven ahead. This mine has the largest continuous body of ore in the county. The grade, though not high, is sufficiently so to give fair returns, and with the cheapening manipulations of ores, which is all the while taking place, it will make one of the leading and good-paying propetries of the country. It has been systematically and advantageously worked, and much dead work done, opening up and getting ready for stoping an immense amount of ore, but the company not having the facilities for handling more, are only taking out about 50 tons of concentrating ore daily, which is reduced 3 tons into 1, say 17 tons of concentrates, which are smelted at the Bullion smelter near by. A portion of the solid smelting ore is of very fair grade and carries well of copper and gold. The hoisting works over the shaft are of excellent workmanship and greatly save labor. The company was employing about 150 men. It retains 20 men upon its rolls, having discharged lately 100 men. This mine is the most productive in Clear Creek County, but has been idle from the 1st of January to the 1st of June; the explanation given for the suspension being that ores cannot be profitably shipped for treatment at Argo or Denver, on account of the railroad charges for transportation. The Courier states that from the 15th of June to the close of the year the Freeland mines produced 4,270 tons, average value to the ton being $45. The reserve in sight is estimated to be sufficient to last two years, working at the present rate of one shift per day. It kept a working force of 100 men in running three tunnels and opening up some stoping ground. This mine is about 50 feet above the bed of Trail Creek. A new level of 205 feet above the Freeland has been driven 826 feet. The gold, silver, and copper in the bullion are in proportions of 62½ per cent. of gold, 25 per cent. of silver, and 12½ per cent. of copper.

Gum Tree, on Trail Creek, about 4 miles west of town, has an adit about 1,000 feet in length and a shaft 150 feet deep running into the adit. The ore-body is quite continuous, of fair width, and of good grade, consisting of copper, galena, gold, and zinc. The mine has lately passed into the hands of a company having ample funds to develop and make it a heavy producer and profitable property. C. H. Calvin is the newly-appointed superintendent.

Donaldson, on Kelly Mountain, about 3 miles west of the town, owned by the Kohinoor and Donaldson Mining Company, is extensively developed by adits, shafts, and drifts, and has a wide vein of ore, both smelting and concentrating, of good grade, consisting of yellow copper, gray copper, pyrites of iron, zinc, and free gold. It is now producing largely, and has in sight a vast amount of ore ready for stoping. The company is pushing the development ahead with the utmost dispatch. In order to make this property one of the leading producers of the camp, a tramway is being constructed to a mill of the capacity of 200 tons daily, to be erected on Clear Creek by Messrs. Frazier & Chambers, of Chicago.

Invincible, about 6 miles west of Idaho Springs, is a newly-opened property, carrying a wide body of good-grade ore, paying from the surface. It is under the management of John Owen, who will soon make it a heavy producer.

Champion, on Bellevue Mountain, about 3 miles northwest of the town, has lately been purchased by the Kohinoor and Donaldson Mining Company, which is doing all possible for its effective and thorough development, being determined on making it a heavy producer. They have planted heavy machinery and hoisting works, and are constructing a tramway to the Frazier & Chambers mill, which is intended to concentrate the ores of this and the Donaldson mine, also belonging to this company. The main working shaft is over 500 feet deep, from which a number of drifts are run and being driven forward. The vein at the bottom of the shaft is from 6 to 8 feet wide, 18 inches of which is solid smelting ore, the residue concentrating. The mineral consists of gray copper, yellow copper, pyrites of iron, gold, silver, and zinc. Several large and handsome specimens of ore from this mine were displayed at the Exposition at Denver.

List of productive mines in Clear Creek County, as reported by E. Y. Naylor, of Georgetown, Colo.

Seventy-Thirty group, consisting of thirteen lodes, patented, containing about 34 acres. Development, 6,000 feet and necessary shafts, winzes, &c.; average width of vein, 8 to 10 inches; average yield per ton, 150 to 240 ounces of silver; total yield to date, $550,000.

Bismarck group, consisting of three lodes. Development, 4,000 feet; average vein, 6 to 24 inches; average yield, 200 to 400 ounces of silver per ton.

Saint Joe lode, patented. Development, 300 feet; average vein, 4 to 15 inches; average yield, 200 to 450 ounces of silver per ton.

Back Bone group. Development, 1,000 feet; average vein, 4 to 8 inches; average yield, 100 to 200 ounces silver per ton.

Captain Wells lode, patented. Development, 1,000 feet; average vein, 6 to 24 inches; average yield, 100 ounces of silver per ton, and 40 per cent. lead.

Main and Phœnix lodes, patented. Development, 8,000 feet; average vein, 10 inches to 3 feet; average yield, 100 to 200 ounces of silver per ton and 40 per cent. lead.

Dunderburg lode, patented. Development, 10,000 feet; average vein, 1 to 2 feet; average yield, 100 to 250 ounces of silver per ton, 40 per cent. lead; yield to date, $500,000, or about that amount.

Colorado United Mining Company, limited, consisting of 10 or 12 lodes, patented. Development, 17,000 feet, perhaps more; average vein, 10 inches; average yield, 300 ounces of silver per ton. Product to date, probably $3,000,000.

Baltimore Tunnel Company's group of mines, consisting of nineteen lodes, mostly patented. Development, 8,000 to 10,000 feet; average vein, 8 inches; average yield, 200 to 500 ounces of silver per ton.

Shively group, Equitable Mining Company, eleven lodes, patented. Development, 300 feet; average vein, 1 to 10 inches; average yield, 300 ounces of silver per ton.

Pelican Dives Mining Company, twelve lodes, mostly patented. Development, 20,000 feet; average vein, 6 inches to 10 feet; average yield, 100 to 350 ounces of silver per ton.

Consolidated Pay Rock group, five or six lodes, patented; average vein, 12 inches; average yield, 250 to 500 ounces of silver per ton.

Vulcan Mining Company, twelve lodes, mostly patented. Development, 2,500 feet; average vein, 4 feet; average yield, 350 ounces of silver per ton.

Nyanza and Fannin lodes, one patented. Development, 1,000 feet; average vein, 10 inches; average yield, 150 ounces silver per ton.

Rogers group, four lodes, patented. Development, 6,000 feet; average vein, 8 inches; average yield, 200 to 700 ounces of silver per ton.

Snow Drift group, Brooklyn Consolidated Mining Company, five lodes, patented. Development, 3,900 feet; drifts, 500 to 4,400 feet; average vein, 4 to 8 feet; average yield, 300 ounces of silver per ton.

Pickwick Mining Company, four lodes, patented. Development, 1,500 feet; average vein, 3 to 6 inches; average yield, 1,200 ounces silver per ton, and some traces of gold.

Big Blue group, seven lodes. Development, 2,000 feet; average vein, 3 to 14 inches; average yield, 600 to 2,000 ounces of silver per ton.

Virginia City lode, patented. Development, 400 feet; average vein, 5 to 6 feet; average yield, 100 ounces of silver per ton, and traces of gold.

Astor group, six lodes, patented. Development, 3,000 feet; average vein, 6 to 18 inches; average yield, 250 to 700 ounces silver per ton.

Hillside Mining Company, two lodes, patented. Development, 1,000 feet; average vein, 4 inches; average yield, 100 ounces of silver per ton.

Lower Summit lodes, patented. Development, 500 feet; average vein, 2 to 6 inches; average yield, 700 ounces silver per ton.

Wide West group, eight lodes, patented. Development, 3,500 feet; average vein, 1 to 30 inches; average yield, 360 ounces of silver to the ton, and 20 per cent. lead. Admirable location, and can be worked for years without expense of machinery.

Jack Frost group, five lodes. Development, 600 feet; average vein, 8 inches; average yield, 100 ounces of silver per ton, and 65 per cent. lead.

Wheeling lode. Development, 300 feet; average vein, 1 to 8 inches; average yield, 300 ounces of silver per ton.

Silver Cloud group, ten lodes, patented. Development, 3,500 feet; average vein, 6 to 36 inches; average yield, 100 to 350 ounces of silver per ton.

Red Elephant group, six lodes, patented. Development, 8,000 feet; average vein, 6 to 24 inches; average yield, 200 to 450 ounces of silver per ton.

The foregoing are all paying properties.

CUSTER COUNTY.

Custer County possesses some remarkable mines; remarkable for their formation and the peculiar conditions under which the ores exist, and also for the extent and richness of the deposits.

The principal mines of the county are found in comparatively a small section of country, situated in the upper end of Wet Mountain Valley, at an altitude of about 7,500 feet above sea-level, which is known as *Hardscrabble district*, and comprises probably about 75 square miles of territory, the towns of Silver Cliff and Rosita being the chief camps and supply points.

The district appears to be divided into what may be termed two distinct mineral belts, one containing chloride or milling ores, and the other smelting ores.

The chloride belt lies in the western part of the district, and the mines are tributary to Silver Cliff.

The Racine Boy, Plata Verde, Buffalo Hunter, and Julianna are mines of this belt, while the Bassick and Bull Domingo are the two principal mines of the sulphide group.

The Song Bird and Gray Eagle are situated near the contact line of the belts and show characteristics of both.

The Bassick mine presents some peculiarities which make it different, not only from other mines of the district, but from mines found anywhere else in the mining region of the country. It is situated on a spur southwest of Mount Tyndall, the formation of which is trachyte and conglomerate, while that of the main hill is chiefly feldspar. The fissure or crevice constituting the ore-body is peculiar in this, that it has no defined walls of country rock, the mineral-bearing portion not differing from the surrounding country except in its richness in the precious metals. The ore is composed of bowlders and pebbles of trachyte covered with layers of mineral. These bowlders are of irregular size and are rounded in shape as if by long-continued attrition in running water, and lie piled irregularly, as though they had been thrown or rolled into the crevice. The portion bearing the precious metals is only the mineral coating or covering, the trachyte itself containing nothing of value. A peculiarity of this formation is that the bowlders must have received their coating of mineral before they were finally in place; in most cases each separate piece has its own mineral coating, which prevents the fragments of trachyte from touching each other as they would have done if the mineral had been deposited subsequent to their being in place and merely cementing them together. The mineral covering of the bowlders or nodules is usually in several layers, which frequently are distinctly marked. The innermost is composed of sulphides of lead, antimony, and zinc, the second of blende, and sometimes this is coated with copper pyrites. They all contain silver and gold in varying proportions. The pyrites are richer in gold, but the blende constitutes the larger portion of the mineral and consequently is the greatest source of the wealth of the mine. The mine has been opened to a depth of over 800 feet, and the ore-body appears to be more an immense chimney than a fissure, the pay being greatest from the central portions and becoming less as explorations are conducted away from that point. In some places the pay ore is not over 20 feet in width and in others it extends to five times that distance. The difference in richness is owing to the mineral covering of the fragments of trachyte becoming thinner and thinner the farther they are away from the central portion of the deposit, until finally they carry too small an amount to pay for mining and extracting.

The Bull Domingo is situated about 5 miles from the Bassick, and is similar in formation except that the mineral carries silver only. The following excellent description of this great mine is condensed from the Mining Review:

This property in its exterior is exceedingly attractive, and for territory includes two original locations, the Domingo and the Johnny Bull, the latter being in the form of an elbow with half its length on the territory of the Domingo, the northern and upper half of each being nearly identical. The company own in addition three other claims not on this vein. They report an expenditure of over $391,000 for improvements and operating the mine, and while they have not explored any part of the property beyond the space of 90 feet near the middle of the mine, they admit that from one hole in that part they have received in money about $272,000.

The mine is located in the southwestern edge of a small group called the Blue Mountains, at the entrance of a little gulch or ravine, and lies mostly on the south side of the first hill of the group, and extends south across the ravine. It also extends northward two-thirds of the way up the hill. The direction of the claim as located and patented is about north 18° west, while the vein is found so far as explored with certainty, and from certain other indications, to bear seven or eight degrees farther to the west. A great red dike of porphyritic granite lies across the line of the vein and claim in a course about north 5° east. This dike is about 30 feet wide, and in strong contrast with the blue or black granite of the mountain-side. The appearances indicate that the dike is broken and the vein continuous at the intersection, no indication of the dike being apparent on the surface for the space of 200 feet, except at this point, which is some 600 feet from the north end of the Domingo claim. The vein dips to the eastward at an angle of about 30°, and all the mineral yet found is along the hanging wall. This vein remains wholly unexplored in all parts north of the dike intersection, and for the space of full 700 feet from the lower end, not more than 100 to 150 feet of the vein being explored, even so far as to know of the course or location of the walls.

Adjoining the Domingo on the east is a vein narrow in width, but from exploration and other indications, is found to be continuous, and seems to be a parallel vein, which shows that the Domingo extends in each direction far beyond the limits claimed by the Company. At the place of operation this vein was 140 feet wide at the surface, and was found to steadily increase, until at the 350-foot level it was 160 feet wide. This increase of width in descending seems to be a characteristic of the veins of this district. The Song Bird, started at 8 feet, is now 17 feet wide at a depth of 300 feet, a clearly defined crevice, filled with the same breccia, cemented all the way down, and improving steadily in the grade and quality of the mineral.

That the exploration of the Domingo by a drift along the hanging wall will reveal the location of large bodies of ore, especially in close proximity to the dike, may be expected, but whether the same will be found in parts of the vein remote from the dike in such great quantities and value cannot be predicted, as a dike, while containing no mineral, generally seems to increase the quantity and richness of the mineral on each side, and for considerable distances, the reason for which is yet a question for science to settle. That the Domingo is not a chimney or irregularly wide crevice at this place, as the result of the nearness of the dike, is clear enough, as the vein was formed since the dike and broke through it, precisely the same as the adjacent rocks.

The Song Bird is a valuable property, and more carefully and faithfully managed than some of the other rich mines. A strong degree of confidence prevails in the minds of some that it may yet rival the best in this district of noted and wonderful deposits. The company is still cross-cutting in the Gray Eagle at the 300-foot level, which is being run in the direction of the hanging wall. This property is being worked with night and day shifts, and the company are manifesting great energy in the development of the mine.

The Julianna Mining Company are working 6 men on the Jenny lode. The shaft is down 64 feet; the vein is 6 feet wide, with a 10-inch pay streak, which shows by assay a value of $40 per ton. The mineral consists of galena and carbonates of lead.

Adjoining this claim on the west is the Connection lode, shaft 60 feet deep, vein 4 feet wide, well defined, carrying galena, pyrites of iron and copper, and is being worked by two shifts.

The Mayde is situated directly west of the Connection, has a shaft down 65 feet, with crevice 4½ feet wide, with a 16-inch pay streak, running from $40 to $80 per ton, while the rest of the vein is heavily mineralized. The company have purchased machinery for this claim, which will be put in place as soon as possible after its arrival, when the shaft will be sunk to a depth of 1,000 feet.

The Lizzie Mac claim, owned by the Julianna Company, is down 30 feet and shows a 7½-foot vein, with a 10-inch pay streak. Work has been resumed on this property.

The Star mine, on Oak Creek, continues to improve with development. It has an immense ore-body, being from 3 to 5 feet of solid ore, principally galena and silver glance. The company will erect a mill in 1883.

Custer County produced during 1882, $200,000 in gold and $300,000 in silver.

DOLORES COUNTY.

The principal mines of this county are situated in *Pioneer district*, at or in the vicinity of Rico, on the East Fork of the Dolores River.

Most of the properties hitherto developed lie on the lower slopes or in the gulches on the mountains, and are easy of access. The veins are large, and although as a rule the ores are of medium or low grade, the quantity and the facility with which it can be extracted compensate for the quality.

Immediately south of Rico the Marrs Consolidated Mining Company have a group of mines on Dolores Mountain, the principal of which are the Newman, Chestnut, Swansea, and Swansea Extension.

The Newman is opened by three tunnels; the upper tunnel is about 140 feet in length, the second 160 feet, and the lower or main working tunnel is 290 feet, driven all the way upon the vein. From the second tunnel a shaft is sunk 70 feet to connect with lower tunnel. From this shaft, 25 feet below the level of the second tunnel, 48 feet of drifting on vein has been done. The vein averages 12 inches of pay matter, quartz carrying sulphurets, gray copper, and decomposed galena, which averages 310 ounces silver and a half an ounce of gold per ton.

The Chestnut has a main working tunnel of 285 feet run on a vertical vein of 10 inches of white quartz carrying galena which averages 75 ounces and 35 per cent. lead per ton. While running in the tunnel a blanket vein of talc and oxide of iron carrying a high grade of sulphuret ore was encountered. In addition to the tunnel of 285 feet the Chestnut has a right drift from the tunnel of 66 feet and a left drift of 18 feet. two small drifts of 5 and 17 feet respectively; a winze from tunnel of 25 feet.

The Swansea is developed by a tunnel of 292 feet, 62 feet from the mouth of which a drift is run north 52 feet. At a point where the drift leaves tunnel a shaft of 55 feet is sunk, from the bottom of which a 12-foot drift is run north. On the drift from tunnel near the end, 52 feet from tunnel, is a shaft of 55 feet. From the bottom of last shaft a drift to the north is run 42 feet, and one to the south 25 feet, the last drift being extended to connect with 12-foot drift from bottom of first shaft. A working tunnel is now under way, which will cut the vein when in

90 feet. The present working tunnel is on a vein of 10 inches, while the 52-foot drift is on a cross-vein the same width, but at the bottom of shafts and on lower levels has increased to fully 18 inches. In the north lower level a 10-inch vein, running parallel to the vein upon which the tunnel was run in on, and about 72 feet from it, was cut. A level will be run on the last vein found as well as the others. Ore from the cross-lode mills 160 to 480 ounces of silver and 2 ounces of gold, while from the tunnel the ore averages about 200 ounces silver. The general character of the ore in the Swansea is a sulphuret and galena in quartz gangue, the galena, however, being less decomposed than in the Newman.

The Swansea extension has a tunnel of 175 feet, from which at 150 feet from entrance a shaft has been sunk 60 feet, and two cross-drifts 20 and 30 feet, respectively, have been run. The vein is a horizontal or blanket. The ore is similar to that found in the blanket vein of the Chestnut, excepting that it carries more oxide of iron and less lead. The general average of ore mined is 75 ounces of silver per ton. All the work done on this location is in the ore deposit, the extent of which is as yet undetermined, only that the end was not reached at 175 feet in one direction, 50 feet in another, or 65 feet perpendicularly.

The other mines of this group are the Stephens, Parsons, Tip Top, and Ocean Wave.

Adjacent to the Newman mine is the General McPherson, which is opened by a shaft of 120 feet; at 90 feet, 2 feet of sand carbonates were found; then a 20-foot contact of decomposed quartz, galena, and manganese, below which a vein of 4 feet, carrying sulphurets and brittle silver.

The Robert E. Lee is adjoining and parallel to the Swansea, has a shaft 53 feet deep, which has struck the contact, from which assays have been had from 100 to 1,000 ounces in silver, and from 1 to 20 ounces in gold. A sample of 25 pounds ran 103 ounces silver and 5 ounces gold.

The New Year, just south of the town, is developed by a shaft of 30 feet, and pits every 50 feet for a distance of 600 feet. The vein is 5 feet between walls of porphyry. The ore, which is in streaks of about 4 inches in width, alternates with streaks of quartz of about the same size. It is galena, copper, and iron pyrites, and a small percentage of zinc, the whole averaging about 50 ounces of silver to the ton.

The Eliza Jane, on the northern slope of Dolores Mountain, is opened by two tunnels of 35 and 85 feet, respectively. The vein, a fissure with unbroken walls, is 6 feet wide, one-half of which is a sulphuret ore that averages by assay 170 ounces silver per ton.

The Silver King, about one mile southeast from Rico, is the property of the Hermosa Mining Company; it has a shaft of 30 feet, a lower level of 40 feet, and an upper level of 200 feet. The vein is quartz, 6 feet, with manganese gangue.

The Rico Smelting Company own the Parole, on which the developments consist of two tunnels, an upper of 40 feet and a lower of 165 feet, the two being connected by a winze. Also from the end of lower tunnel a shaft of 92 feet, exposing a vein of 120 feet in width with 4 feet of carbonates of lead, which averages 20 to 50 ounces silver and 40 per cent. lead. It is a valuable smelting ore. The shaft will be sunk not more than 10 feet deeper, when drifting will be begun, and the force probably increased to three shifts. About 6 tons of ore are being taken out daily, which output will be largely increased as soon as drifting is commenced and an additional force put on. About 70 tons of ore now lie on the dump, which will be shipped to the Rico smelter as soon as sufficiently dry. Being a very moist ore, drying is necessary.

The Grand Duke, situated below the Parole, has an incline of 170 feet sunk on a vein of 6 feet in width, carrying a pay streak of 30 inches which averages 50 ounces of silver to the ton.

The Golden Fleece, owned by Summa, Roe & Co., is worked by contract. It is opened by two shafts, showing a 2-foot vein of lead and sand carbonates. It is very clean ore, being almost entirely free from zinc or other base metals, and consequently can be very cheaply treated. The ore runs above $80 in silver per ton, with a heavy per cent. of lead ranging from 50 to 75. No blasting is required, pick and shovel only being necessary.

The Black Hawk, east of Rico, has four distinct veins, each of which has been opened by a tunnel, the first tunnel being 50 feet, with an 18-foot shaft at the end; the second, 25 feet cross-cut to vein; third, 18 feet, and fourth 25 feet. The first vein is 5 feet, with galena and white iron ore, averaging throughout 45 ounces of silver. The second vein is 25 feet wide, with 2 feet pay, of lead carbonates, averaging 35 ounces silver. Third vein, 5 feet of black manganese, carbonates, and copper pyrites, averaging 500 ounces silver. Fourth vein same as third.

The Lelia Davis lode can be traced on the surface for several hundred feet, and in point of location the mine is one of the most convenient on the mountain. At present it is reached by a trail, but by working the mine through a tunnel below the shaft, a short chute or tram would take the ore to the gulch below, where a good wagon-road could be built to town. The ore as it lies on the dump will probably average 60 ounces silver, but from the mine, at the bottom of the shaft, where the vein is a good 6 foot fissure, the average will be higher.

The Dawn of Day, Orphan Girl, and Wild Cat, about 1½ miles east of the town, compose a valuable group.

The Dawn of Day has a 60-foot shaft, with a 60-foot drift from the bottom, on a 5-foot vein of black manganese and carbonate ore.

Orphan Girl has had 150 tons of ore taken from the surface, which run from 50 to 70 per cent. iron, and was needed at the smelters for a flux.

Wild Cat has 30 feet adit on a galena vein.

On Telescope Mountain the Wabash mine is the property of the Wabash and Democrat Consolidated Mining Company, and is one of the best mines in this vicinity. It is being developed in a systematic manner with regard to permanence of the mine. The main working shaft is 115 feet deep, from which a drift has been run 40 feet. An incline has also been sunk on the shaft 61 feet, from which four levels have been driven, all in ore. The general direction of the ore-body is southwest by northeast, dipping in the latter direction about 30° from the horizontal. It lies in a contact between lime, sand, and porphyry. The extent and amount are as yet entirely undetermined. The general character of the ore is a galena and carbonate interspersed with manganese and iron. A mill run on 60 sacks by the Rico smelter gave a return of 32 ounces silver and 34 per cent. lead. As the company already have a large amount of ore out of the mine awaiting home facilities for treatment, but a small force of men are now at work.

The Pigeon adjoins the Wabash on the southeast, and is one of the oldest locations in the camp, having been located since the early spring of 1879. Two tunnels, 20 and 38 feet, respectively, expose an ore-body of carbonates similar to that found in the Wabash. The assays run from 20 to 150 ounces silver and 10 to 40 per cent. lead. A shaft, which is being sunk at the lowest point on the property, is now down 60 feet, exposing at the bottom the same mineral body found in the tunnels higher up the mountain. From this shaft drifts can be run that will get a good depth in going under the mountain. The outcrop of the Pigeon is easily traced on the entire length of the claim.

The Santa Clara mine, on the same mountain, is owned by the Santa Clara Mining Company. The vein is a contact 40 feet wide, the entire vein matter being ore of a good working grade. It is a free-milling chloride of silver, averaging throughout $35 per ton.

The main working shaft is down 65 feet, with an incline from the bottom driven in 65 feet, making the actual depth 130 feet. There is also a level running in 55 feet in the opposite direction from this incline. There is a second shaft down 35 feet, with a level run in from the bottom 45 feet. There are also three tunnels or adits run in from 15 to 35 feet on the vein. The ore is treated by the German amalgamating process, being dried, crushed, and passed into a large revolving steam cylinder, where it is chloridized and amalgamated at the same time. This cylinder corresponds to an amalgamating pan, placed horizontally instead of perpendicularly, and the ores are chloridized in the pan.

On Nigger Baby Hill is the Grand View group, belonging to the Grand View Mining and Smelting Company, and comprising the Grand View, Phœnix, Yellow Jacket, Major, and Pelican.

The Grand View is developed by an incline of 154 feet, an upper level of 200 feet and lower level of 75 feet. The vein is a fissure, averaging 3 feet in width, with a 22-inch pay streak. The ore is an oxide of iron, black manganese, and lead carbonates, yielding about 100 ounces of silver per ton. It is a valuable smelting ore on account of the amount of iron contained, running as high in some cases as 30 per cent.

The Phœnix and Yellow Jacket are on the same vein, and are worked as one mine. The vein averages 3 feet in width, with 20 inches pay, while in some places the pay extends throughout the vein. A marked increase in the pay ore is noticeable from the upper to the lower levels. The character of the ore is similar to the Grand View, except that it carries copper pyrites and more lead in the form of galena, the latter increasing with depth. The workings consist of an upper level of 170 feet and a lower level of 280 feet, both on the vein. The two levels are connected by a winze of 170 feet, while between the two is a drift of 65 feet, also on the vein. When the upper level is in a few feet farther a cross-cut will connect it with the vein on the Grand View location. Below the 280-foot level is another of 110 feet, and a cross-cut through slide rock of 25 feet. The other properties of the group have not been so fully developed. The company have a 50-ton smelter, a stamp mill, and concentrator, all well arranged for economical working. The mines send down the tramway to the smelter about 10 tons of good ore every day, besides a large quantity of less valuable stuff, containing some silver, but principally valuable on account of other ingredients required for smelting.

The Rico No. 2 is developed by a shaft 40 feet in depth, with ore assaying 75 ounces to the ton.

The Ah Jay has a vein of about 3 feet in width of galena and black manganese, milling at the rate of 60 ounces of silver to the ton. A tunnel is being run to cut the vein at 280 feet from the tunnel mouth and 250 feet in depth from the outcrop.

The Bellevue lode is situated on the east slope of Expectation Mountain, about one mile from town, and is developed by a 75-foot tunnel, and shows a 3-foot fissure vein of good ore. It is owned by Hale Bros. & Brown.

In Horse Gulch is the Puzzle, belonging to an English company, which own also the Little Carrie and Mark.

On the Puzzle the development consists of a discovery shaft of 31 feet, a cross-cut tunnel, now in 55 feet at lowest point on claim to cut the vein, then to be used as a main working tunnel and drain for the mine. The present working tunnel is in 50 feet, from which an incline of 17 feet exposes the vein. On the vein from the bottom of the incline a drift of 60 feet is run to the west, and one of 140 feet to the east. From the west drift a stope 50 by 12 feet has been made. The vein is a blanket that averages 5 feet in thickness, about one-half of the vein matter being a decomposed quartz carrying sulphuret and native silver ore. The ore has averaged in milling from 150 to 1,400 ounces in silver per ton. Three hundred tons of ore have been shipped and treated, some to England, some to Newark, N. J., and other lots to Denver and elsewhere in the State, all these shipments bringing the company a handsome return.

The Puzzle Extension is worked by a shaft sunk 60 feet to the vein. From the bottom of the shaft and on the vein a drift of 24 feet is run westward, and one of 68 feet to the east. These two drifts are the only work done on the vein, yet a large amount of high-grade ore has been taken out and successfully treated. Another shaft is being sunk near the side line, which will cut the vein at a depth of 60 feet. Eighteen men are at work constantly. In the west drift, where the ore-body was comparatively untouched, a lot of 10 tons was taken out which averaged 70 ounces silver.

The Balzora mine, in Horse Gulch, is being actively developed by its owners, John Ault and George Sanborn, who are running a cross-cut tunnel to tap the vein at a distance of about 125 feet. The vein is 20 feet wide, with numerous mineral streaks through it, varying from 2 to 18 inches in width. The mineral is gray copper and zincblende, assaying from 60 to 150 ounces of silver.

The Petzite, opposite Elliott Mountain, has a cross-cut tunnel 20 feet, with a shaft 50 feet at one end, and a cross-cut tunnel lower down of 26 feet. Width of vein 4 feet; pay streak 5 inches. The ore is a telluride of gold and silver, in some instances giving very high assays. A mill run on a small lot ran $213 in silver.

Near the head of Horse Gulch is the Johnny Bull. The developments are a shaft of 120 feet, sunk to the tunnel, the latter cutting the vein 230 feet from the tunnel mouth. The ore, a gray copper and black sulphurets, averages from 100 to 200 ounces silver, and 25 per cent. copper per ton. Several tons shipped to Denver averaged a net profit of $175 each, after paying all expenses of mining, shipping, and smelting. The mine has paid all the expenses of development from ore mined, including the expense attending the driving of the tunnel, which has been thoroughly and substantially timbered.

Adjoining the Johnny Bull is a group of six claims, owned by J. W. Winkfield & Co., consisting of the Mountain View, Etta Belle, Ellen A, Little Wink, Morning Star, and Nettie.

The Mountain View is an extension of the Johnny Bull. The work on it consists of two shafts, 42 and 45 feet deep.

The Nettie, which is opened by a 38-foot tunnel, shows ore similar to that found in the Johnny.

The shaft on the Little Wink is now down 20 feet.

The Badge is located at the foot of Mount Elliott; 70 feet of tunnel opens a vein, which is 12 feet in width, and assays from 14 to 37 ounces. It contains iron carbonate ore.

The Little Sadie, Royal George, Chittenden, and Raymond, all on Mount Elliott, are the property of the Dolores Mining and Milling Company.

The Little Sadie is opened by three tunnels, exposing a vein of chlorides, antimony, gray copper, and black sulphurets, nearly all free milling. The ore runs from $64 to $1,200 in gold and silver.

The Dolores Valley Mining Company own eighty-four claims in Pioneer district, and in Cascade district between Rico and Durango, in La Plata County, which they are opening and developing as rapidly as possible. These claims are the African, Alice Edith, Amaranth, Amherst, Argonaut, Argosy, Atlanta, Atlas, Bank, Banner, Blue, Buena Vista, Butterfly, Cantata, Canyon, Cascade, Cashier, Castle Rock, Castle Rock Springs, C. B. & Q., Cliff, Columbia, Confidence, Deer, Dolores Peak, Empire City, Excelsior, Florence, Fortune, Gaspereaux, Great Western, Hawkeye, Hercules, Hic Jacet, Hope, Huerfano, Iron, Ironsides, Jenny Lind, Jessie Fremont, La Camino, La Plata, Little Corporal, Little Giant, Lone Star, Long View, Lucy, Maid of Athens, Maple, Mariner, Marquita, Mattie, Milan, Mountain Monarch, Nevada, New Discovery, Nonsuch, Nonpareil, Octagon, Octoroon, Panneo, Peru, Pigeon, Pine Tree, Pope Joan, Present Help, Prometheus, Red Man, S. B. W., Shakespeare, Silver Cache, Siver Star, Quilgee, Stony Point, Summit, Sunnyside, Sunset, Tenderfoot, Two Thirsty, Vampire, Variety, Whip-poor-will, Woonsocket, and Zulu.

The production of the country in 1882 was $10,000 in gold and $110,000 in silver.

FREMONT COUNTY.

While the mines of this county carry silver in some instances in sufficient quantities to prove remunerative, they are better known for their production of the base metals, copper, nickel, cobalt, &c.

The Gem mine is situated in the southern part of the county, about 1 mile north of the line of Custer County, and about 12 miles northwest from Silver Cliff. It is the property of the Saint Joseph and Silver Cliff Mining Company. The ore yields nickel, cobalt, copper, silver, and a little gold; it is shipped to Swansea for treatment. The last shipment gave 12.30 per cent. of nickel, .93 per cent. of cobalt, and 7.20 per cent. of copper. In 1881 the mine produced about $15,000, but no shipments were made in 1882, as only development work was done. The ore is growing richer in nickel and cobalt as depth is attained. The company contemplate erecting works for its treatment at Cañon City or at Blackburn, on the Silver Cliff branch of the Denver and Rio Grande Railroad.

The Cotopaxi and Saltiel group of mines at Cotopaxi are in a granite formation and yield zincblende and copper ores, which are shipped East for treatment, the zinc to the Illinois Zinc Works, and the copper to Baltimore.

The New Era mine, in Cotopaxi district, produces copper ore which yields fairly in silver.

At the Green Mountain mine important developments were made during the latter part of the year, and at places within the surface lines ore chutes have been uncovered, and in all cases the output is large and valuable. Two parallel porphyry dikes form the side lines of the claim, and between the two, the broad crevices in the metamorphic rock are all filled with copper ore, red and black predominating.

In cross-cutting the ore chute, samples from the heading show native copper in abundance, black sulphurets, azurite, malachite, and red oxide of copper. There are no signs as yet of approach to the hanging wall, unless the enhanced value of the ore in the present workings may be considered an indication. Some conception of the extent and value of this ore chute can be formed by the statement that it has been penetrated by the cross-cut for a distance of 10 feet; that the product when first reached had an average value of about 9 per cent. of copper, midway to present point 16½ per cent., while that at breast will doubtless yield not less than 25 per cent. Thus the 10 feet of ore may be expected to yield an average of 17 to 18 per cent. of copper, or 340 to 360 pounds per ton of ore. The company is prosecuting work in a vigorous manner, aiming at production at an early day. The intent of the management is to develop the lode thoroughly during the winter and establish reduction works in the spring.

The Belle lode, at Grape Creek, is from 4 to 6 feet wide, the ore yielding gold, silver, nickel, and cobalt. An analysis gave gold one-half ounce, silver 2½ ounces, nickel 4.1 per cent., cobalt 2.85 per cent. Traces of titanium, tellurium, and bismuth were also observed, as were arsenic and antimony in large quantities.

An assay test of ore from the Lady Martha returns 1½ ounces of gold, or about $31 per ton.

The Tip Top, Redbird, Osceola, and Delaware are other properties worthy of note.

My estimate of the production of the precious metals in the county in 1882 is $20,000 in silver.

GILPIN COUNTY.

This county lies on the east slope of the Rocky Mountains, between James Peak and the valley. Its mines annually produce more than those of any other county in the State, and since 1860 their total production has amounted to upwards of $35,000,000 in gold and $3,000,000 in silver.

The great mines of the county are on or near such well-known hills as the Bobtail, Quartz, Bates, Gregory, Gunnell, Central, Monmouth, and Casto, surrounding Central City, the chief mining center of the county, from which $747,740 of gold bullion was sent during the year by express.

The gold belt extends through the county from east to west, having belts of silver-bearing ores on each side, and embraces an area of from 3 to 4 miles in length and 1 mile in width. There are in the county about four hundred gold and silver bearing veins, which are similar in their general character. The greater number have an east and west strike, although the strike of some prominent lodes is northeast and southwest. The veins vary from 2 to 20 feet in width, and their dip seldom reaches an angle of 15°. The country rock is usually granite or gneiss, and in some cases ores are found in or adjacent to porphyry and hornblende.

The gold ore is of two classes, known as milling and smelting. The vein matter is usually composed of feldspar and quartz, with auriferous iron pyrites, and varies in hardness. Near the surface, in the early workings of the mines, the ore was decomposed material which could be easily extracted. At greater depths sulphurets of iron and copper were encountered, from which the gold could not be extracted by the methods then practiced, and the amount obtained was not sufficient to pay the expense of extraction and shipment, except in cases of the richest ores. After large expenditures in experimenting to ascertain the most economical and profitable manner of treating these ores, works have been successfully established for their reduction. Some of the veins have been traced to a depth of over 1,300 feet, sufficiently proving that they are true fissures, of great value and extent.

Central City Hill.—The German tunnel has been extended about 700 feet into the Central City Hill, cutting several veins, and aiming to strike the Gregory No. 2, Homer, Main, Monmouth, Golden Age, Golden Eagle, and Golden Fleece. The company, having exhausted its capital of $15,000, has suspended operations.

The Galena lode, on Central City Hill, south of the Canandaigua, is owned by the Palms Gold Mining Company. A frame building 24 by 50 is completed over the main shaft, which is down 335 feet. The developments during the year have been sinking the shaft 135 feet and driving levels—one at the 320-foot level, east 75 feet and west 100 feet.

About half a mile above Black Hawk, in Chase Gulch, the Ætna mine, owned by H. M. Hale, is developed by an adit extending westerly 550 feet and by a shaft 60 feet deep from the surface. The Ætna has a mineral vein carrying large bodies of galena, iron and copper pyrites, and zincblende, bearing gold and silver.

The Robert Emmet runs into and under Maryland Mountain and has been worked by several lessees. It sent its ore for treatment to the Polar Star mill, and obtained from 8 to 10 ounces of gold per cord.

On the Prospector development work has been done by a tunnel and an adit 320 feet, and by a shaft two drifts east and west 150 feet, and a roomy shaft-house over the main shaft with mining machinery.

On the Billings an adit has been driven 400 feet on the vein and a shaft sunk below the adit. It belongs to the Valley View Mining Company.

On Bobtail Hill is the Arctic mine, an early location, a little over a quarter of a mile from the Bobtail mine. Its main shaft is 305 feet in depth, from which drifts have been run and considerable ore extracted. During the year a shaft was sunk 60 feet and 125 feet of levels driven. Over the main shaft is a shaft-house 30 by 50, conveniently arranged and containing proper machinery.

The Bonanza and Union tunnels have been consolidated and are worked under the same management.

The Union tunnel is being driven through Bates or Casto Mountain from Chase to Gregory Gulch, a distance of 2,500 feet, cutting the mountain at its highest point at a depth of 600 feet. It has been extended from its initial point, in Chase Gulch, 626 feet, and has already crossed the White Spar, Stull, Maryland Vein, Kettle, Swede, and Como lodes. The following table shows the distances between the veins crossed and the amount of drifting on each:

Name of vein.	From initial points.	Drifting east.	Drifting west.
	Feet.	*Feet.*	*Feet.*
White Spar	170	15	4
Stull	183	20	5
Maryland Vein	290½	135	25
Kettle	469	161½	26
Swede	513	73	4
Como	556	44	4

The resources of the company are employed in opening up and exploring undeveloped veins, and the ore is piled up at the tunnel entrances for future treatment. It is said that the company has on hand 5,000 tons of ore assaying from $28 to nearly $200 per ton, and as yet no ore has been milled or sent to the smelter since commencing operations. The tunnels are double track, and floored and boarded up, with waterways and air-pipes underneath.

The Bonanza tunnel is opposite the Union, and is to be extended from Chase Gulch to North Clear Creek, through Maryland and Bonanza Mountains, a distance of 4,400 feet, and at a depth of over 900 feet at the highest point. The heading of the tunnel is 1,100 feet from its mouth and has intersected fifteen veins which have been developed as follows:

Name of vein.	From initial point.	Drifting west.	Drifting east.
	Feet.	*Feet.*	*Feet.*
Wealth of India	50	4	4
A Vein	165	10	10
B Vein	276½	4	4
C Vein	318½	6	4
Little Pete	348	9	13
Maryland:			
First Branch	372½	45	5
Second Branch	394	13	4
Proper	403½	8	455
Bonnell	477	99	19
Flood	550	4	26
H. B. Hyde	671½	131½	95½
Ruby	806½	5	7½
Kentucky	878	22	204½
McCorkle	1, 025	70	128
Cornish	1, 063	18	31

The Americus lies between the Sleepy Hollow and Fisk lodes, on Bobtail Hill; it is developed by a shaft of 270 feet and 300 feet of levels. The ore as returned from the mill averages $43 net per ton for smelting ore, and the mill dirt 4 to 5 ounces per cord.

The Cotton, Denmark, Molly Stark, Little Harvey, and Bedford County have been worked on a small scale. The main shafts of the Denmark and Bedford County mines are each down about 200 feet.

The production of the Bobtail Gold Mining Company is considerably less than in former years. The 125-stamp mill has not been run at its full capacity, and the ore has been of low grade. The development has consisted in driving the west tunnel level. No work has been accomplished below the 500-foot workings on account of the enormous expense and great quantity of water to be pumped, which came in so rapidly as to make it necessary to raise 700 gallons per minute, and involved the consumption of a large quantity of coal, of which the company used for all purposes about 800 tons per month.

Nevada district.—The Gunnell Consolidated is one of the principal producing mines in Gilpin County. Its production for the year 1882 was $121,308.45, and its total product to December 31, 1882, $1,281,362.02. The total product of the mine for the twelve months preceding December 1, 1881, was $75,024.57. The following is the published statement of the production of the mine in 1882 by months:

Month.	Source.	Amount.	Total.
January	Gold	$1,690 20	
	Tailings	486 42	$2,176 62
February	Gold	3,751 17	
	Tailings	317 51	4,068 68
March	Gold and smelting ore	4,878 66	
	Tailings	533 02	5,411 68
April	Gold and smelting ore	11,779 56	
	Tailings	638 61	12,418 17
May	Gold and smelting ore	6,367 68	
	Tailings	381 43	6,749 11
June	Gold and smelting ore	7,753 00	
	Tailings	418 56	8,171 56
July	Gold and smelting ore	8,361 66	
	Tailings	346 61	8,708 27
August	Gold and smelting ore	14,518 08	14,518 08
September	Gold and smelting ore	10,129 87	
	Tailings	376 44	10,506 31
October	Gold and smelting ore	18,135 60	
	Tailings	561 89	18,697 49
November	Gold and smelting ore	18,591 48	
	Tailings	664 45	19,255 93
December	Gold and smelting ore	10,174 04	
	Tailings	452 51	10,626 55
	Total for year 1882	....	121,308 45

The Saint Louis Extension, formerly known as the Newfoundland, is on the southerly slope of Gunnell Hill; its main shaft is 380 feet deep. It was one of the heavy producers in Gilpin County in former years.

The Mountain Lion is on the south side of Gregory Gulch, above Turner Hall; its development consists of a shaft 80 feet deep with a drift east and west 60 feet. It has sent a small amount of ore to be milled.

The U. S. M. lode crosses Gregory Gulch on Lawrence street; its main shaft is down 90 feet, but the mine produced but little ore.

The Gregory lode is owned by the United Gregory Mining Company, and situated on Gregory Mountain. During the year 1,120 feet of levels have been driven and 153 feet of winzes and 31 feet of shafting sunk. The company also owns a 50-stamp mill in Gregory Gulch, with engines, boiler, hoisting apparatus, pumps, &c., inclosed in a large-sized building. The production of the mine in milling and smelting ore is reported for the year at $145,000.

North of the Gregory lode, and crossing Gregory Gulch, is Hope No. 2, upon which two shafts have been sunk to a depth respectively of 90 and 200 feet. From the latter drifts have been extended in all about 150 feet. It has a building over the main shaft, with boiler, engine, and hoister.

The Rialto mine, in Central City, crosses Gregory Gulch under Turner Hall; it has been developed by an adit 250 feet in length, and a shaft has been sunk 100 feet. The average of the mill dirt as given by mill returns is 3½ ounces per cord, and of the smelting ore $38 net per ton.

In Eastern Nevadaville, southwest of the Gunnell, is the Prize lode, in which the shaft has been sunk a depth of 675 feet and 1,300 feet of levels have been driven. A little ore has lately been taken out, but the workings have been confined to opening up unexplored ground.

The California Gold Mine Company owns the California and Hidden Treasure mines on Quartz Hill. The company during the year enlarged the building over the California mine, set up machinery, rearranged the shaft to three compartments—double bucket-way and ladder-way—and have increased the capacity of the mine to carry the workings of the vein to a depth of 2,200 feet.

The production of the mine in 1880 for eleven months from January 1 was $184,811.36; its expenses $64,055.01, giving a net profit for eleven months of over $120,000. Operations remained suspended from the 1st of September, 1881, until the mine was purchased by the present owners. Since the 28th of August to the close of the year the production of the mine was 728 cords of milling ore of a gross value, as per return in bullion and concentrates, of $47,175.22, and 294 tons of smelting ore, amounting to $17,330.95, making the total returns $64,506.17. The average value of the ore was $12.65 per ton.

The Hidden Treasure is on the same vein as the California. Besides these two mines the company owns a 50-stamp mill in Black Hawk, and employs at the mill 11 men, in the California mine 76 men, and in the Hidden Treasure 17 men. The company purchased the Hidden Treasure near the close of the year. At the time of the sale the shaft had already attained a depth of over 1,300 feet—the deepest in the State of Colorado—and a contract had been executed to sink the shaft 100 feet lower.

The Monitor, adjoining, and parallel with the Hidden Treasure, has not been worked for some time. Upon it three shafts have been sunk, one 160 feet, another, further to the eastward, 125 feet, and another, still further to the east, 100 feet in depth.

The Dutchman lode, on the northerly slope of Quartz Hill, between the California mine and the Burroughs lodes, is the property of the Dutchman Gold and Silver Mining Company of New York. The shaft has been sunk by contract 150 feet; work has been prosecuted at intervals. The smelting ore returned $65 to the ton and the mill dirt from 2½ to 5 ounces per cord.

On the western portion of the Flack lode the shaft has reached a depth of 800 feet. It has also been worked by lessees, who have employed 6 miners and taken out an average of 12 cords of milling ore per month and 6 tons of smelting ore.

On North Nevada Mountain, north of the Jones mines, is the Hubert, upon which only development work has been done.

The Rhoderick Dhu, E. W. Henderson superintendent, has been worked by lessees and considerably developed. Its main shaft is down a depth of 550 feet, and improvements have been erected. The machinery formerly in use has been discarded, and a 25 horse-power boiler with improved hoisting gear put up.

The Illinois, east of the Egyptian, has been largely developed and improved with a shaft building and powerful machinery. During the year the main shaft was sunk 120 feet. A winze has been sunk 100 feet and 450 feet of levels have been driven. The ore so far has been of low grade; none was extracted during the year, the work being confined to development.

The Egyptian, owned by the Egyptian Mining Company, according to a published statement, extracted ore during the year to the amount of $31,000, the average value of which was about 4 ounces per cord for milling, and from $85 to $185 per ton for smelting ore. The improvements consist of a shaft building and 25 horse-power stationary engine and boiler, and an improved hoisting rig. The vein dips about 20° to the south. The shaft is securely timbered up, the stulls in the levels are arranged with mill holes at proper intervals for cheap and convenient handling of the ore, which is taken in cars over the tramway of T-rails. The mine has been developed by a main shaft 670 feet deep, and levels run at different stations east and west.

A portion of the Kansas vein, formerly known as the Monmouth-Kansas property, was not worked vigorously in the first half of the year, only running 126 feet of drifts, producing 269 cords of stamp-mill ore and 270 tons of smelting ore. The general average of the ore mined gives $17 per ton. The main shaft was sunk 50 feet the latter part of the year, giving a depth of 1,360 feet. The company has a 52-stamp mill near the mine, of which 10 stamps are employed on custom ore. The best paying ore is found on the 1,350 and 1,150-foot workings. On the 1st of August this mine passed into the hands of the Denver Gold Mining Company; it formerly belonged to the Quartz Hill Consolidated Mining Company.

The Kent County mine was taken possession of by Mr. Richard Mackey, of Nevadaville, for the non-payment of $70,000 due him on the purchase money, $110,000; but work was not suspended, as sufficient ore was extracted to keep 40 stamps of the Quartz Hill Consolidated Mining Company's stamp mill running for a portion of the time. Since the property passed into the hands of the present operators the working shaft has been sunk 101 feet, giving a total depth of 868 feet. The 800-foot west level has been run 408 feet; the 700-foot level west is in from the shaft 518 feet. In the same length of time 155 feet of winzes have been sunk. The ore has yielded from 2 to 14 ounces of gold per cord of milling ore and quite high in smelting ore.

Southwest of the Kent County is the Barker lode, which has a working shaft 230 feet deep. The character of its ore is the same as the other mines of that vicinity, varying from 4 to 8 ounces of gold per cord for the milling ore and from $50 to $100 per ton for the smelting ore.

South of the Kent County is the Ina lode, upon which three shafts have been sunk, 110, 75, and 25 feet, respectively. A large body of low-grade quartz ore, averaging 2 ounces gold per cord, was struck in the drift 30 feet east from the 75-foot shaft.

The Nimrod and the Pyrenees are on the summit of Quartz Hill, and are worked by lessees, who have taken out paying quantities of good ore yielding from 3 to 7 ounces of gold per cord on milling ore and from $30 to $60 per ton on smelting ore. The Nimrod has a shaft building and fine plant of machinery over the main shaft, which is down over 350 feet.

The Aurora Gold Mining and Milling Company owns a group of 7 veins on the southerly slope of Quartz Hill, known as the Charter Oak, Blagden, Effie, Ezra White, Gem, Augusta May, and North Eclipse, on all of which, in former years, more or less profitable work has been done.

Over the Charter Oak, the central mine of this group, a main shaft, which is 80 feet deep, has been retimbered and widened and a building erected 28 by 46 feet. The surface ore of this group of mines has heretofore paid well.

The National lode, on the easterly slope of Quartz Hill, has been worked under a lease. It has 2 shafts, at the depths respectively of 105 and 125 feet, which are connected by a drift of over 100 feet in length.

The Centennial tunnel, under German Mountain, starts in Central City on Gregory street, above the old Apollo Hall; has been driven nearly due south over 400 feet and already crossed some thirteen lodes, the twelfth known as the Hope and the thirteenth known as the Tierney;

a connection has been made with the main shaft of the latter. The tunnel is 8 by 7½ feet in the clear, with a T-rail track and water-way. The ore varies from 2 to 4 ounces for the milling and from $28 to $100 per ton for the smelting ore. The vein matter in the Tierney, where struck by the tunnel, is said to be 10 feet wide, and from all the veins more or less ore has been extracted.

The Messrs. Koenig & Klein Brothers have erected a shaft building and ore-house, with plant of machinery, upon the main shaft of their mine on German Mountain, west of and adjoining the property of the Susquehanna Company, and have been drifting and taking out ore which varies from 3 to 8 ounces per cord for milling; the smelting ore contains gold and silver and about 8 per cent. of copper.

The Mountain City lode has erected during the year a shaft-house over the working shaft, which is down 200 feet. The vein is cut by the Centennial tunnel at a depth of less than 200 feet.

West of the Illinois, the Edgar Mining Company owns the Edgar mine. No work has been done during the year, although its shaft has been sunk 75 feet. It was a small bullion-producer in former years.

The Quartz Hill tunnel, which has been projected to pass through Quartz Hill and intersect its veins, has penetrated 1,148 feet from its entrance; 50 feet were driven during 1882, and 300 feet of new car-track laid with T-rails.

The Fourth of July was worked a few months under a lease by a pool of Cornish miners. Its ore is low grade, the smelting averaging $25 per ton and the milling 3 ounces of gold per cord.

The Scandia, belonging to the Central City Gold and Silver Mining Company, was operated for only a part of the year, having been shut down near the close of the year; it contained a valuable plant.

The Columbia tunnel was projected to pass through Quartz Hill, cutting the Columbia, Colorado, Corydon, Burroughs, and some other veins, and has been driven 140 feet from the entrance.

East of the First Centennial, and on the same vein, is the Denver mine, on the southerly slope of Maryland Mountain. The Bonanza tunnel will strike this vein in its course through the mountain.

One of the principal mines in the *Quartz Valley district* is the First Centennial, which has been developed by sinking shafts along the vein, the deepest of which is 260 feet, driving levels and running an adit to a point where the Belden tunnel runs through Winnebago Mountain, crossing the vein. The lessees took out in the fall of 1882, according to a published statement, $18,832.50 of stamp-mill ore, giving a net profit of $9,166.80, including all dead work.

The locations upon the Boss lode for a distance of nearly a mile, extending from North Clear Creek on the east, are owned by the same parties. They have started a tunnel from the North Clear Creek slope, the head of which is in 200 feet. Several shafts have been sunk on No. 2, at the summit of the mountain, a shaft building and cobbing-room erected, and a plant of machinery has been set up. A small force of men has been employed, but the sale of 11,000 pounds of ore extracted by two men working about five weeks, according to a published statement, netted $2,400.

The Missouri has been worked by lessees. It has a shaft building over its main shaft, which is down 250 feet, and its ore averages for milling 4 ounces of gold per cord, and for smelting $65 per ton.

The Thanksgiving group, west of Harper Ranch, consists of seven veins, which have all been explored by shafts, the deepest of which has been sunk about 100 feet. But a small amount of ore has yet been taken from these mines.

The Quartz Hill group, embracing the Bouvier, Telegraph, Telephone, and Phonograph, is in *Illinois Central mining district.* Several shafts have been sunk on these mines, but have not reached any great depth.

The Mechanic tunnel, located above the Eureka Foundry, has been driven on the vein some 330 feet. It is to pass under Gunnell Hill at a depth below the surface of 420 feet.

The James Henry mine has been worked under a lease several months during the year. Its development consists of a cross-cut run from the 200-foot level south to cut the south vein, which has not been reached.

The shaft of the Pleasant View has been sunk to a depth of 450 feet. The mine has been worked during the year under a lease. Some ore treated at the New York and Empire stamp mills at Black Hawk yielded from 2 to 6 ounces per cord.

Eureka mining district.—The Rara Avis is on the south slope of Prosser Mountain. The property of the company consists of three locations on the Rara Avis lode, situated on Prosser Mountain between Central City and Nevadaville. The company has a first-class concentrating mill 60 by 40, with an ore-house 50 by 25. The ore is sent through a Blake crusher, carried by automatic feeders to a pulverizer which has a capacity of 60 tons per day, then passed over an amalgam plate 122 inches long by 55 wide, and is then carried to a concentrating table, of which the company has five, three Embry and two Bradford. The mill site is at the face of the tunnel in Eureka Gulch. The development of the year consisted in sinking the working shaft on the Whitney mine 60 feet and driving east and west, each 80 feet, on the 350-foot level and pushing a cross-cut and adit to connect with the 300-foot level. The cross-cut and adit is 1,220 feet in length; the working shaft 360 feet in depth.

Within the limits of Central City, north of Prosser Gulch and parallel with the Gunnell mine, on Gunnell Hill, is the Wood lode. The ore is not as high grade as that of the Gunnell. The main shaft is sunk to a depth of 200 feet.

At the Columbia Avenue mine, on Prosser Mountain, 13 miners have been employed in the mine and on the surface. Its main shaft is down 470 feet, and the 200-foot east and west levels driven 132 and 145 feet respectively. At 300 and 400 foot stations levels have been run east and west 25 feet each. A comfortable building, conveniently arranged, has been constructed over the main shaft, and machinery set up ample for hoisting purposes.

The Congress and Senate are on Prosser Mountain, west of the Columbia Avenue and south of the Whitney mines. Their shafts have not been sunk to sufficient depths to come to solid mineral.

On Negro Hill the Freiburg Gold and Silver Mining Company, after erecting a shaft building, closed down, and the property was attached by creditors.

The Iowa, north of the Freiburg, was bonded, and has since been but little worked.

The Cottage, west of the Harkaway, is developed by a shaft 90 feet in depth and by drifts; its ore carries copper pyrites and galena. On the Harkaway but little work has been done.

The Keystone lode, which adjoins the R. H. D., at the close of the year was idle, but was previously worked for a number of months under an option and bond. Its main shaft is down 110 feet, and connection through a drift 85 feet east has been made with a 60-foot shaft, and the ground above the drift is pretty well stoped out. Farther west is another shaft, 25 feet deep, from which, in surface workings, considerable pay ore has been extracted. The pay ore in the vein averages 4 ounces of gold per cord.

The R. H. D., adjoining the Polar Star, has been opened at intervals through several shafts for over 500 feet; but little work has been done during the past year. The owners took out in the summer and fall mill ore which yielded from 5½ to 10 ounces of gold per cord.

The Polar Star has been worked at different points under a lease. The deepest shaft under the property is down 100 feet.

Russell district.—The Decatur Silver Mining Company owns a number of veins located in Willis Gulch, namely, the Decatur, Helmer, Herschel, and Paul lodes, which are in the same belt as the Saratoga, Haseltine, Silver Dollar, and War Dance. On the Helmer the shaft has been sunk to a depth of 200 feet. The mine has been during the year under the management of different superintendents, who successively resigned, and the mine was finally closed down, with suits pending against it for unpaid liabilities. The property belongs to a New York company.

The Haseltine belongs to a Philadelphia company. The mine was closed during a portion of the year, but near the close was again profitably worked by lessees. The company owns concentration works, and has made numerous improvements for facilitating the handling of the ore. The following is published in regard to the returns from ores taken out by one lessee and sent to the smelters:

Weight.	Price.	Net value.
5.070 lbs.	$231 30	$588 80
2,075 lbs.	69 70	70 84
Total received for first and second class		659 64

The Saratoga, situated on Saratoga Mountain, between the main Willis and Russell Gulches, near the Haseltine, belongs to the Saratoga Gold and Silver Mining Company. The main shaft is about 150 feet deep. The vein is said to be a true fissure, the full width of which has not been determined, and the ore runs from 2½ to 14 ounces of gold per cord. The mill gold obtained from this ore is said to be purer and brings a better price at the banks than most mill retorts offered for sale.

Below the Haseltine, on the southeasterly slope of Willis Gulch Mountain, is the Silver Dollar, belonging to the Silver Dollar Mining Company. Its working shaft is 262 feet deep, well timbered, and divided into three compartments—ladder, bucket, and pump way. It has about 900 feet of drifts running upon the different levels from the main shaft, and a substantial shaft house, with engine, boiler, fixtures, and machinery. The mine is in good shape for working, and its 6-inch Cornish pump easily draws off the water accumulating in it. The work has been confined to opening new, undeveloped ground, and the output of ore has been comparatively light.

The lessees of the Powers, north of the Silver Dollar, upon raising the water and *débris* that had accumulated in their shaft, and sinking the latter, came upon a fair-sized body of enargite in their workings, carrying not only silver, but a high percentage of copper.

The War Dance is on Silver Dollar Mountain, on the slope toward the main Willis Gulch. It has a working shaft 240 feet deep.

The Anchor Mining and Milling Company, of Saint Louis, owns the

Helmer and Anchor mines, southeast of the Silver Dollar, and a 10-stamp mill with fixtures, which proved a failure and was closed down, being unfitted for the character of ore found in that locality.

The Arizona group of mines is partially in Clear Creek County and partially in *Russell district*, in Gilpin County. The two principal mines are the Arizona and Kenton. The former has two shafts 95 feet apart; the one is down 125 feet, the other 95, both connected by a drift. One hundred and fifty feet have been driven on the vein during the year and some ore extracted.

The Colorado Champion is below the mouth of Willis, on Russell Gulch. The owners, being troubled with the gulch water, put up a California whim. No ore from this mine has yet been sent to the mills for treatment, although considerable has been piled up ready for shipment.

The Republic Mining Company own what is known as the Pewabic group of mines, and also a 25-stamp mill in Graham Gulch. This group was idle up to July, when work was resumed on the Iron mine, south of the Pewabic. In the last half of the year 300 feet of levels were driven from the shaft and a railroad track 1,100 feet in length was laid from the Iron mine to the mill. The mill ore is of low grade, but the facilities provided for its extraction, transportation, and treatment make the mining profitable. The tramway gives satisfaction and does away with wagon transportation. The track is so arranged as to run a loaded and an empty car, a switch being provided in the center of the track. There are two cars used, both self-dumping, one having a capacity of one-third of a cord, the other one-fourth. The track is over 1,000 feet, substantially constructed, and operated very economically. At the mine these cars are run up to and under a dump slide, which receives the ore as hoisted from the mine, and from which the cars are loaded. After loading and passing over the tramway to the stamp mill they run in from the main track on a curve and dump in front of the mill batteries.

The Aduddell has been worked by lessees, who have taken out mill ore yielding 6½ ounces per cord, and smelting ore from $18.50 to $40 per ton. This mine is developed by three shafts, the deepest of which has been sunk to a depth of 150 feet.

The Richardson and the West Pewabic are also productive mines, from which considerable ore has been extracted.

The Wyandotte Consolidated Gold and Silver Mining Company own several claims in Russell district, which have been profitably worked. They own the Wyandotte, West Wyandotte, Mollie Newcomb, Leavenworth, East Leavenworth, and Calhoun lodes. The Wyandotte has an engine, boiler, and ore-house. The main shaft has been sunk 370 feet. All of these mines have been worked more or less, and their total production during the year, according to a published statement, amounted to $6,000.

Near the Wyandotte is the McKay-Leavenworth, which has been opened by 360 feet of drifts and a shaft over 500 feet deep, 110 feet of the latter having been sunk during the year. Its ore is low grade, averaging about 2½ ounces per cord for milling and $75 per ton, net, for smelting ore. The building and machinery were burned the latter part of the season, but work was not interrupted. A small shaft-house has since been erected and a California whim set up.

East of the McKay-Leavenworth is the Center, upon which a shaft has been sunk to a depth of 100 feet, and parallel to it are the Oregon and Pontiac, owned by the same parties.

From the White Cloud, at the head of Virginia Cañon, considerable rich ore was extracted. The following has been published as the production of the mine from ore treated at the Cashier mill during the year, up to the 6th of June:

Date.	Cords.	Ounces.	Penny-weights.	Grains.
February 11	2	30	30	00
February 28	1	10	1	12
March 14	2	14	7	00
March 20	2	12	14	18
April 4	1½	26	6	00
April 25	1½	23	12	00
May 4	2	10	13	18
May 6	1	16	2	00
May 29	1	19	0	00
June 3	2	12	17	12
June 6	1	7	8	00
Total	17	184	12	12

A shipment of 2½ cords of milling ore from this mine to the Randolph stamp mill, at Black Hawk, yielded 30 ounces 16 pennyweights and 12 grains of gold. This was unexpected. The ore, from its appearance when taken from the mine, seems to be of an inferior quality.

The Prompt Pay, in Lemon Gulch, on the north side of Russell, has been worked by lessees. Its main shaft, which is well timbered and conveniently arranged, is 140 feet deep. Its mill ore runs from 2¼ to 4½ ounces per cord, and the smelting ore from $100 to $200 per ton.

On the West Minnesota, which is spoken of as a promising prospect, only assessment work has been done.

Upon the Air Line lode, a relocation of the Ringgold, west of the head of Russell Gulch, only assessment work has been done.

In *Russell district* Messrs. Thurmond & Hamilton have erected dry-ore concentration works. Their building is a stone structure 50 by 130 feet. The following is a description of their process of treatment, by which it is claimed the ore can be treated at a cost of $1 per ton:

"The ore is first dried on driers erected for the express purpose. After this, it passes to the upper portion of the building, where the ore is shoveled into a crusher, from which it passes between heavy Cornish rolls, and thence falls into the concentrator. This is a tight box, wedge-shaped, through which a current of air is constantly being drawn by a large fan entering at the larger end; the motion of the air is increased as the small end is reached, and thus a graduated current is obtained; at the upper side of the large end the ore passes on to the graduated screens, and by the motion given to the screens gradually moves forward. The air passes from underneath through the screens and pulverized ore, and lifting the lighter gangue carries it out, while the ore falls through and is caught below; after passing through the throat of the apparatus the space enlarges, and in this the gangue settles, to be taken up by an elevator and removed from the building. The concentrates may be divided into two or more grades as to fineness, as may be desired, and the finest obtained by this process are as minute as particles of flour dust. All this work is automatic; from the time the ore is fed to the crusher, no human hand touches it until the concentrates are sacked; then the sack is removed and another put in its place."

Independent district.—The Rollins Gold and Silver Mining Company own a group of mines, among which the Perigo is the most noted; they also own the Perigo 30-stamp mill. A large amount has been expended in driving tunnels upon the different mines owned by the company. The company have driven a cross-cut tunnel 900 feet on the Perigo, and have run the Crown Point 935 feet, at a cost of $6,265; Colorado tunnel, 495 feet, at a cost of $4,300; White Pine tunnel, 66 feet, at a cost of $690; the New York tunnel, 71 feet, and the White tunnel, 55 feet.

The cross-cut tunnel on the Perigo has reached the Darby shaft at a point where the vein is 230 feet below the surface, and is said to be of an average width of 18 feet, containing ore netting for smelting about $50 a ton and for milling ore $14.50 per ton. This is said not to be a pocket of pay material that has been passed through, but stands for a running distance of over 500 feet, and with a width of 20 feet, with no waste material or gangue, but all sufficiently rich to send to the stamp mill or smelter. The production for sixteen months, taken, according to a published statement, from the superintendent's books, was:

Produce of a 16-stamp mill	$51,000
Smelting ore sold to smelters	16,000
Total	67,000

During the year a shaft-house over the Darby shaft was fitted up, and among the other improvements at the entrance of the lower cross-cut tunnel a building, two stories in height, 30 by 60, was erected, on the first floor of which was placed a Rand improved air-compressor of 50 horse-power, and on the second floor rooms were suitably arranged for the convenience of mechanics and workmen. The tunnel is 6½ by 7½ in the clear, and timbered with 8 by 10 hewed-timber sets, placed at a distance of 4 feet between centers. A car track has been laid with **T**-rails, air-pipes, and air-shaft.

From the Daisy, north of and parallel with the Perigo, for several months ore was extracted and the mill ore crushed at the mill of the Golden Flint Mining Company, at the head of Gamble Gulch. Three hundred and fifty-two ounces of gold were obtained from 100 cords of milling ore sent in three months to the mill for treatment.

Enterprise district.—On Silver Mountain is the Cyclops, one of the most valuable silver mines in Gilpin County. A published statement has the following relative to the production of this mine: During the year 1881, 125 tons of ore were produced, containing 11,266 ounces of silver; average number of men working for that length of time was 6; total production to January 1, 1882, was $90,589. In 1882 the output of the mine was comparatively light, the principal work having been employed in the development of unexplored ground, sinking of shafts, driving of levels, timbering, &c. The main shaft is down a depth of 350 feet, divided into three compartments. The main shaft-house is 58 by 30, and an ore-house 18 by 30 has been erected, connected with the shaft-building by a car track. It has a 75 horse-power duplex steam boiler, a 45 horse-power engine, and a two-story cobbing room 35 by 20, where the ore raised from the shaft is trammed and dumped into ore bins, of which there are 6, from the second story. Opposite the bins are cobbing tables, where the ore is sorted and sacked for transportation.

In the same vicinity as the Cyclops is a group of silver mines owned by the Gould Silver Mining Company. Work is still progressing in these mines, but irregularly.

Assessment work has also been done upon the Fanny, in the same vicinity, and upon the Colorado Chief, south of the Silent Friend, but no production has been reported.

East of Hughesville is the Toronto, from which the output for the year 1882, as published in the Register-Call, was $8,157.40, and its total production since its discovery in 1878 nearly $40,000. It is developed by several shafts, the deepest 120 feet.

At Hughesville is the Hard Money, upon which a working force of 16 men was employed. Up to the 1st of May, 1882, the total production of the mine is stated to have been $47,000, mostly through surface workings. From the 1st of May to the 2d of December the production is said by the Register-Call to have been $1,457.06 in doing dead work. The following are the prices paid for several shipments of ore to the smelters: 4,775 pounds, $269.50 per ton; 4,130 pounds, $132.80 per ton.

East of the Toronto is the Wellington, in the *Mountain House district*, which at present is not being worked; and near to the Wellington is the Lynn, which is being prospected.

Vermillon district.—The Cameron Consolidated Silver Mining Company own a group of mines partly in Clear Creek County, and the remainder in *Vermillon district*, in Gilpin County. The latter are known as the Birdie Bell, Genevieve, Sheridan Hill lode, Sheridan Hill Nos. 2, 3, 4, and 5. The company have prospected these mines by a cross-cut tunnel in Little Hamlin Gulch, near the southern boundary line of the group, which runs in a northerly course to cross the gulch at right angles, and when driven up will be 900 feet below the crest of Sheridan Hill. These mines have been developed by several shafts.

The Manitoba is on the northerly slope of Sheridan Hill. Over the main shaft, which is 137 feet deep, a shaft-house 48 by 60, with ore-sheds and blacksmith shop, was built in April, and a large plant of machinery set up, consisting of an engine, boiler, pump, and complete hoisting rig. The water has been somewhat troublesome, but the 4-inch Cornish pump has been able to handle it without interfering with the work of development.

The development of mines in *Vermillion district* has been impeded by its distance from supplies and the deep snows, which limit work to summer and fall.

The Bitzenhofer tunnel commences near the mouth of Miners' Gulch, its course being a few degrees west of south, aiming to pierce the mountain separating Miners' and Freeman Gulches. It is intended to cut in its course several veins, among them the Zierney and Grant. The veins will be tapped at depths of from 240 to 600 feet. The tunnel is in a distance of 100 feet.

Considerable ore has been taken from the Running lode, on the southwesterly slope of Running Mountain, and sent to the Humphrey concentration works at Black Hawk. It has two shafts 300 feet deep, which are connected by a level 700 feet, a shaft-house 35 by 50, and a building for assorting ore 30 by 62; also a 20 horse-power engine, 30 horse-power boiler, and an improved hoister.

Upon the Gettysburg lode, on Bates Hill, four shafts have been sunk, the deepest 200 feet. It has sent its ore to the Polar Star mill at Black Hawk, and obtained from 7 to 8 ounces of gold per cord. Its smelting ore nets about $50 per ton.

South of the Cashier, on Monmouth Mountain, is the West Gregory, which has been developed by several shafts and an adit from Packard Gulch, running west on a line with the vein.

Lake district.—The Golden Age Mining Company are working the Golden Age mine, upon which the main shaft is down 315 feet, 100 feet having been sunk during the year. A winze also has been sunk 50 feet and levels driven 110 feet during the year.

On the same vein as the Golden Age, and parallel with it, is the Carr, formerly known as the Parent. The latter is idle, although it has a well-timbered shaft 280 feet deep.

From the Chemung a large amount of valuable ore has been taken out, both in the last and in the previous year. It is developed by several shafts, the deepest being down about 100 feet. It has been worked by lessees, and a sale of 23 tons of smelting ore netted them, according to published statement, $1,317.

The Williams employed a working force of 20 miners under ground. The output of the mine for the month of December, 1882, as published in the Register-Call, was 15 tons of smelting ore, sold to the smelters, netting an average of $80 per ton; 10 cords of mill dirt, treated at the stamp mill, yielding from 2½ to 10 ounces gold per cord. The tailings sold netted $19 per ton.

The easterly extension of the Williams is called the East Williams lode, from which no ore has yet been sold, although considerable development work has been done. The ore contains galena, zincblende, copper pyrites, and brittle silver.

Below the East Williams is the Mascot, discovered in May last, from which in prospecting (chiefly by adits) ore was extracted that sold for $2,500.

From the main shaft of the Grizzly lode, at the head of Davenport Gulch, the owner has driven levels and taken out ore some of which gave 9 ounces of gold per cord for milling and $90 per ton, on an average, for the smelting ore.

The Golden Flint, at the head of Gamble Gulch, is opened by several shafts, in which the mining was profitable until a depth of 260 feet was reached, when water prevented further profitable development and the mine was closed down. The company owns a 15-stamp mill and building a short distance below the mine, now operated under a lease.

Northeast of and upon the same lode as the Golden Flint is the Golden Anchor, upon which several shallow shafts have been sunk and an adit driven a distance of 230 feet.

The number of stamps now in operation in Gilpin County is as follows:

Bobtail	75
California	50
Cashier	35
Daisy	15
Empire	25
Freese	15
Fullerton-Meade	40
Hidden Treasure	15
Kansas	40
New York	75
Perigo	16
Pewabic	25
Polar Star	35
Randolph	50
United Gregory	50
Total in operation	561

The total value of bullion shipped from Central by the Pacific Express Company for the year 1882 was as follows:

January	$71,140
February	68,750
March	71,100
April	62,435
May	58,750
June	54,200

July	$52,000
August	54,965
September	70,850
October	64,300
November	66,250
December	53,000
Total	747,740

To this must be added the amount of gold and silver estimated to have been carried by private conveyance, and the returns from the smelters, which give the product of the county as follows:

Companies making returns, &c.	Gold.	Silver.
Shipments by express	$747,740	....
Golden Smelting Company	117,380	$45,666
Miners' Smelting Company	105,763	22,868
Boston and Colorado Smelting Company	364,000	114,927
Moore Smelting Company	72,740	70,196
Other smelting companies	2,000	1,173
Tailings shipped	60,000	5,865
Miscellaneous	125,000	....
Total	1,594,623	260,695

GUNNISON COUNTY.

From Pitkin Mr. Charles H. Cornwell writes that the production of *Quartz Creek district* has been small, but that extensive preparations are being made for developing the district. The mines are being opened and mills erected. Seven of the latter are nearly completed, and several more are expected to be erected in 1883.

On Contact Ridge the Way Up (contact of quartzite and lime) has 116 feet incline shaft in vein, at bottom of shaft between solid walls, fully 50 feet wide, all in high-grade mineral, lead carbonates. Mill runs give $85 to $150 per ton; have 7 men at work taking out ore and developing the claim; will have 15 men at work in February.

The Fairview, on Fairview Mountain, a contact of quartzite and porphyry, has over 600 feet development, proving up a large vein of mineral, which will mill-run $200 per ton; ore of a carbonate nature, highly impregnated with chlorides; has 1,000 tons of ore on dump, and can make an output of 25 tons daily.

The Silver Islet, on Islet Mountain, has 1,300 feet of development, in shafts, tunnels, and levels, exposing veins varying from 20 to 53 feet wide, mineral-bearing throughout, and ore averages $50 silver per ton. Have several thousand tons out; capable of an output of 40 tons per day. There is an enormous quantity of ore in sight. Mineral is chlorides and sulphurets, with small per cent. galena. A mill of the Carter-Bancroft process has just been finished, and is now in full operation, turning out 90 per cent. of the ore taken. A silver brick weighing 71¼ pounds, now on exhibition, 945 fine, valued at $1,200.

On Middle Fork the Margaret, the first claim located on the fork, has 150 feet development in tunnel and shaft; vein between quartzite and granite, six feet wide, bears heavy galena ore running $100 per ton.

On North Fork the Silent Friend and Robinson & Ferry (extension) are now attracting more attention than perhaps any other mining property in the county. Discovered in May, 1882; has now 225 feet development in shafts and drifts; have shipped 550 tons ore, carrying galena, gray copper, and lead carbonates; mill-runs $85 to $200 per ton.

The Mineral Farm, consisting of the Whettemore, Nevada Boy, and Nevada Boy Consolidated, has 127 feet shaft on the Whettemore. Vein not in place. Bowlders weighing from 50 to 25,000 pounds found on the surface, which assay from $12 to $500 per ton.

The Simpson has 20 feet development, joins the Clara, and promises well.

The Clara lode, an extension of the Mineral Farm, contact of lime and porphyry, has 75 feet development. The mineral is galena, showing sulphurets and chlorides; 8-foot vein assaying from $36 to $110 per ton; average across vein, $75.

The Surprise, lying between Hall's Gulch and Mineral Farm, the Lake, and Quartz Creek on Surprise Hill, 1,500 feet above the creek, has 50 feet shaft, between lime and porphyry walls, 15 feet wide, all the way in quartz carrying gold and silver; next to the porphyry wall lies 3½ feet iron; this contact lies between two ledges half a mile apart. The owner will have it developed early next spring, when carbonates are looked for.

In Jones Gulch, the Volunteer vein is extensively proved up in tunnels and shafts over 300 feet, and is being worked in shaft and two tunnels; ore mill-runs $60 per ton, three-fifths gold and two-fifths silver; vein in tunnel 4½ feet wide, all in mineral. A mill will be put up in connection with it. A tunnel site, consisting of 103⅓ acres, has been located covering the mine. One-third interest changed hands in July for $10,000.

The Lucille has 373 feet of shafts, tunnels, and drifts; vein 12 to 14 feet between walls, with 4 feet pay ore; mill runs $100. The owners have in operation a 10-stamp mill, which will mill 20 tons of ore daily, two Frue vanner concentrators, and 14 men at work. The ore carries gold and silver. Frank Carlin, superintendent.

The Sunny Side has 60 feet incline; between walls 4 feet; 1 foot pay streak, gold and silver. Work will be renewed in a few days and pushed.

The Pilot's development, 80-foot shaft, the vein 3½ feet wide, one-third pay. Property lies within 1 mile of Sultana mill.

The Sultana and Sultan has 60-foot shaft between walls of granite 14 feet apart, and a pay streak of 4 feet; the ore by mill run yields $50 gold and silver; a tunnel of 90 feet shows 2-foot vein in place; there are other developments, but no vein found. This property is considered a good one, but litigation stopped work on it.

The Bertha has 45-foot shaft, showing a 4-foot vein between granite walls in place; ore-mill runs $20 gold to a ton; has also a tunnel 60 feet, showing 3-foot vein of the same kind of ore, and mill-runs as above.

The Moonstone has 140 feet of tunnel, the vein 6 feet between granite walls in place; the ore will mill $12 per ton gold, and promises to be a good claim.

The Fortune's Favorite has 200 feet tunnel and 25-foot shaft; the vein 5 feet, carrying gold; will mill-run $14 per ton; work will be carried on extensively at an early date in the spring.

In Spring Gulch, the Williams lode, situated on western slope of Gold Ridge, has a vein 6 feet wide, on which 25 feet drifting has been done; the crevice matter will all pay to mill, and large pannings have been made. Picked specimens show free gold. The vein was reached in a 45-foot tunnel, and there are several tons of ore on dump, say 75 tons milling ore at least, assaying as high as $152 per ton.

The Pitkin is an extension of the Williams, and has two shafts showing the Williams vein.

The Omarurah has a shaft 42 feet deep, 5-foot vein between solid walls in place (porphyry and granite); the ore very good-looking quartz, which assays from $120 to $152 per ton in gold. Work will be resumed in the spring with a good force.

The Kimberly has an 80-foot shaft between porphyry and granite wall solid and in place, the vein 6 feet, with splendid looking quartz, carrying $80 gold per ton. Developments will be made when the snow leaves.

The Wild Boy has a tunnel 58 feet in mineral but not in place; carries good white iron; gold and silver assays show $34 to $60 per ton.

The Oriental, situated on south side of Ohio Creek, has 25 feet shaft between granite and porphyry walls, 4 feet vein, and the ore assays $18 to $50 in gold.

The Sonora has 70 feet shaft between porphyry and granite walls in place, solid, vein 4½ feet wide; the ore mill-runs from $30 to $1,800 per ton. This claim is a very promising one, and the owners will do a good deal of work at an early day.

In Hill's Gulch, the Sacramento has 100 feet shaft between granite walls; the vein is 4 feet wide and pay streak 2½ to 3 feet; also a tunnel 250 feet long, on the vein about 175 feet. The ore carries gold and silver, assays of which made at different times running $35 to $300, the average on fifty assays being $48. A mill run of same shows $52 gold and silver and 5 per cent. lead.

The Corydon is the extension of the Sacramento; has same ore and 200 feet of development.

On Gold Hill, at the head of North Fork, the Porcupine, of Porcupine group, is a contact of quartzite and lime; the vein is exposed the entire length of claim and apparently 20 feet wide; assays from top rock $55 silver per ton; ore beautifully copper stained and contains gray copper. It has a shaft 130 feet and tunnel 375 feet.

The Eureka No. 2 (Porcupine group) is in granite and has 120 feet shaft in vein 10 feet wide, with mineral from wall to wall, worth on an average $70 in copper, lead, gold, and silver. It also has a tunnel 340 feet in length, which connects with the shaft at the distance of 300 feet. The vein is wider than the tunnel.

The Porcupine group has shaft-house over Porcupine shaft, tunnel-house, blacksmith's shop, carpenter's shop, coal-house, full of charcoal, timber out-house, cook-house, bunk-house, rail track, provisions for the winter at the works, and six men at work. At an early date in the spring shipments of ore will be made from both Porcupine and Eureka No. 2. This property will be as valuable as any in the district on development; it consists of eight claims, all showing good mineral, and 60 acres of placer.

The Napoleon has a tunnel in 170 feet, exposing a large vein of galena, which assays $40 to $100 per ton; work is being done by four men and ore is now being shipped. The owners are preparing to take out and market a large quantity during this season.

The Myrtle joins the Napoleon, and is on a contact between lime and quartzite of a carbonate nature, the vein 4 feet wide and improving in richness, the development about 140 feet.

On Gold Ridge, the Maggie Mitchell and Emma C. (extension) changed hands in May for $20,000 cash; has over 150 feet development on a vein 5 feet wide with a fine pay streak; 125 tons of ore out, from which a 5-ton mill run in June yielded $35 per ton. The ore looks well.

The Comstock, nearly on the dividing line between the gold and silver belts, is on a contact between porphyry and granite; has three shafts, one 100 feet deep and two 50 feet each, all showing the vein; there is also a level being run at 100 feet in depth; pay ore averages wide throughout and runs $30 to $40 per ton gold and silver, and is impregnated with lead carbonates.

The Joe Davis has 60 feet shaft and the vein is 5 feet wide, carrying a 20-inch pay streak; vein defined with perfect walls and is proved up in two shafts on the Highland Chief (extension). The Joe Davis has 50 tons of pay ore on the dump.

The Dodson has 100 feet incline shaft on the vein; the crevice is 3 feet wide, carrying a 2-foot pay streak.

The Chicago, parallel with the Dodson, has 60 feet incline shaft and two tunnels, 110 and 35 feet respectively; the incline follows a 44-inch vein with 36 inch pay streak.

The Sugar Bowl has 200 feet incline shaft on the vein and 25 feet drift at 100 feet in depth; another drift has been commenced at bottom of shaft; the vein carries 12 inches of pay and the ore averages well.

The Golden Currie, parallel with the Williams lode, has an incline shaft 100 feet deep on the vein and several tons of good ore on the dump. Extensive operations are contemplated this summer. The vein carries between 2 and 3 feet of pay ore.

The Eighty-One has a shaft 43 feet deep, showing a 7-foot vein between well-defined walls; the entire crevice matter is mineral-bearing, and will average about $15 per ton; developments will be continued.

On German Flats the Gold Monument has a shaft 100 feet deep, in which the vein is 5 feet wide, carrying a fine pay streak; mill runs $30 gold having been obtained from similar ore; it has 75 to 100 tons of ore out on the dump, and will be worked extensively in the spring.

The Cincinnati has 265 feet development; the vein shows up 800 feet, 5 feet wide, mostly medium ore.

The Gold Hill has 30 feet incline shaft, and will probably be largely developed. The vein is 26 inches wide; the ore assays from $75 to $300, and it will mill-run not less than $30.

The Tidal Wave has 100 feet shaft between granite walls; width of vein 3 feet of pay ore; mill-runs $50 per ton. There is another vein, 2½ feet, on this claim as good as the one mentioned.

On Terrible Hill is the Terrible, a contact of lime and porphyry; it has over 200 feet development in shaft and drifts; ore distinct in character and appearance, carrying bromide of silver, chlorides, gray copper, and galena; yields an average of $75 per ton gold and silver; very rich free-gold bearing ore being taken out; the vein has an average width of 3½ feet, all in mineral and perfectly defined.

The Hoosier Boy is being extensively operated; changed hands in June last for $10,000; the vein not in place, but excellent mineral is is obtained.

The Chloride King, on a contact of porphyry and lime, has a strong vein; the ore is copper-stained and rich in chlorides; it will be extensively worked this season.

The Friend and Needham, Silver Dell Roller, Mossback, Little Alta, Silver Jewel, Gray Beard, Prince of Denmark, Niger, Barbara, Mineral Ranch, Revere, Simpson, O. K., Daisy, Little Myra, Little Emma, and Ben. Franklin, will be developed this season.

On Green Mountain, the Governor St. John, a contact of lime and porphyry, has 170 feet shaft and drift, 50 feet of drift on the vein, which is 12 to 14 feet wide, liberally streaked with very rich ore, richly copper-stained, and carrying chlorides, sulphurets, and galena. There are 100 tons of ore on the dump, including chunks weighing several hundred pounds; there being no wagon-road it was impracticable to get ore down.

Assays show from $70 to $1,000 per ton. On development the St. John will become a valuable property.

The Green Mountain, of Green Mountain group of mines, has some development, which, with work on the Robinson, Second National, Broadis, Ora S., and other claims in the neighborhood, has given Green Mountain the reputation of being the richest in mineral of any mountain in the district. These claims are soon to be fully opened.

At the head of Quartz Creek the Brittle Silver has 900 feet of development in shafts, drifts, and tunnels; the vein is in porphyritic granite, 6 feet wide, carrying 6 to 18 inches of pay ore; it contains some gold; the ore is mostly high grade, showing silver glance; 20 tons of ore have been shipped; mill run from $50 to $800 per ton. The owners have let contract of 100 feet shaft.

The mines of the Quartz Creek district gold belt are fissures in granite formation; ore decomposed, heavily iron-stained quartz, free milling, except in rare instances; slight indications at the surface of lead in various forms, and other minerals tending to render ores rebellious decrease and disappear as depth is obtained.

On Cumberland Ridge, the Legal Tender has 170 feet development in tunnels and shaft, all in vein; the deeper work shows to best advantage, and among the features a 2-foot streak of white quartz, showing free gold; the vein is 3 feet wide with 2 feet pay; 30 tons ore milled yielded $25 to $30 per ton. The mine is located within half a mile of three stamp mills now in operation.

The Moonlight is being rapidly developed in tunnels and shafts by Gilpin County parties, who bought it recently for $30,000; has a 70-foot shaft and drifts; vein, with solid walls, carries a very rich pay streak 2 feet wide, and ore richer than at any previous depth, showing free gold and yielding remarkable pannings. A mill is erected on the claim.

The Midnight mine was recently purchased by Denver parties for $18,000, and is now being rapidly developed. It has over 200 feet in shafts and drifts, all in the vein, which carries from 18 inches to 2 feet of rich pay ore; remarkable pannings have been made, one of six pounds of rock giving $3.50 in gold; the entire vein matter will yield not less than $20 per ton.

The Golden Slipper has about 100 feet development, all on vein 2½ feet wide; about 10 inches pay streak; assays are good as any in the belt.

The Bright Light (an extension of the Golden Slipper), opened for 750 feet, shows mineral assaying from $100 to $3,000; vein 2½ feet, pay streak 10 to 12 inches thick.

The Maudy May lies parallel with the Golden Slipper, is opened up in two places, and shows 8 inches of rich mineral.

The Cumberland, discovered last June, sold six weeks afterwards for $6,000. It has a 50-foot shaft on a strong vein showing free gold; about 50 tons of ore are on the dump.

The Echo, an extension of the Cumberland, has a 60-foot shaft, and the vein is 3 feet wide.

The Florence was located in June, is showing well in shaft; 25 feet down the vein is 2½ feet wide, all pay, and averages better than Gold Belt ore; the vein is also opened up elsewhere on the claim.

The Oil Exchange has 40 feet shaft incline and 60 feet tunnel, the vein matter over 7 feet wide, carrying 2 to 3 feet pay; developments will be continuous; the ore is not very high grade.

The Golden Gate has 55 feet incline shaft; shows 5 feet vein, with 2½ feet pay; the ore fair grade. The Golden Gate will mill its ore this summer.

The Goldsmith, discovered in May, 1882, has 60 feet discovery shaft and two levels, 10 feet each. The vein in discovery shaft is 8 feet wide between granite walls; the whole vein is pay ore, gold and silver; assays made at different times run from $124 to $1,348. The mill run from 2 tons taken from the surface runs $30, taken from the vein as it came out. No mill run has been made from ore taken out where the $1,348 ore at bottom of shaft was taken. Say 350 feet down the hill they have run in a tunnel 50 feet, all the way on the vein, also a shaft at the mouth of tunnel 25 feet on vein, showing the vein is continuous and in place.

Tomichi district contains several rich mines, and promises to become one of the largest ore-producing camps in Colorado. The first development of the district began in 1880, but not much was done till 1881. In 1882 more strikes of importance were made, more capital has been invested, and more ore shipped than in any previous season. During the year a concentrator has been built at the town of Tomichi, and will be operated early in the spring. The district is some ten miles in length and five or six in width. Tomichi is situated in the center of the north half of the district, and White Pine in the center of the south half. The principal mines in the vicinity of Tomichi are the Lewiston, Sleeping Pet, Legal Tender, Hiawatha, Rockford, Montgomery, and an orebody struck in the San Francisco tunnel. These are all noted properties, but several others in the same vicinity promise as well when a little more developed. The following mines in the immediate vicinity of White Pine are now paying properties: The North Star, Carbonate King, Alwilda, Lily, Romance, Rights of Man, Denver City, and a body of carbonates adjoining the latter claim. Of the abovenamed mines about half are in lime and quartzite formations, the other half in granite. Extensive bodies of magnetic iron and carbonate of iron exist in the district. While a great many mining camps of the State are almost depopulated there are more people to-day in the Tomichi district than at any previous time. During the past season ore was shipped from the North Star, Carbonate King, Lewiston, Legal Tender, Sleeping Pet, Rockford, and Montgomery mines with satisfactory results. All the other mines mentioned above have ore in sack or on dump ready to ship as soon as opportunity affords.

Among the incorporated companies that are now actively engaged in development of property in the district may be mentioned the Montgomery Gold and Silver Mining Company. They are running a crosscut tunnel to cut the Coin Silver No. 2 lode. The tunnel is now driven about 250 feet, and will cut the lode in from 350 to 400 feet from the beginning. The Gunnison County Gold and Silver Mining Company is now running a tunnel to cut the Little Nick and other lodes. The Chautauqua Mining Corporation has been actively engaged in developing the Excelsior; about 500 feet of work has been done, and contracts let for work to be prosecuted all winter. The Bill Short and Eastman Consolidated Company own the concentrator recently built, and some very rich mines, among them the Legal Tender and Montgomery. The latter company has done a great deal of work in the camp and is now shipping ore. About half a dozen other corporations have done more or less development in the camp, and in most cases will resume work early in the spring. There is a reasonable hope that the Denver and Rio Grande will build a branch to the district at an early date, as the distance is but 12 miles from Sargent and the grade is an easy one.

Tin Cup district is situated about 45 miles from Gunnison City. Saint

Elmo and Pitkin are the nearest railroad points, each being about 20 miles distant. The camp was first started in 1879, but on account of its isolation is not as well known as its output and resources would justify. A good wagon-road was constructed to Pitkin the last year, and a toll-road furnishes an outlet to Saint Elmo. About 600 miners are at work in this district, and more development work has been done than at any previous time in the history of the camp. Among the paying mines now working are the Gold Cup, Jimmy Mack, Iron Bonnet, Geo. D. Roberts, Cyclops, Mayflower, Anna Dedricka, Drew, Silver Cup, Little Gold Cup, Anna's Treasure Tunnel, Emma Burr, and many others. The veins are fissure and blanket veins. The ore-bodies are all large and carry mineral in great variety. The silver is chiefly in the sulphide and chloride forms. Galena ores are showing up more every day, and also considerable lead carbonates. Silver-bearing quartz is the predominating form of ore.

The ore produced is all high grade, and finds a ready market at the Virginia City smelter, located two miles below Tin Cup. The smelter is in first-class running order, and is turning out a car load of base bullion every four days, the value being $6,000 per car. The smelter gets its galena ores for fluxing purposes from the Doctor mine on Spring Creek, and the Silent Friend in Quartz Creek district. From recent developments the district will soon produce its own lead ores. The iron used for fluxing is procured from Anna Mountain, in Tin Cup district.

The Gold Cup mine has been one of the most productive mines of the district, and development work has steadily continued, showing up large ore reserves. A body of ore was struck in October last which ran $320 in silver per ton.

The Tin Cup mine is the extension of the Gold Cup. About $20,000 have been spent in developing this mine, and about 450 tons of ore have been shipped, the value of which was over $80,000. A small shipment of picked ore brought $6 per pound. Considerable ore is on the dump.

The Drew mine adjoins the Tin Cup. It has been worked steadily; has 600 feet of development; shipped 25 tons of ore last year that assayed $200 per ton. They are taking out mineral now with a small force, and waiting for smelter to increase work. Contact vein, lime and porphyry walls; chloride and galena ores.

The Jimmy Mack shipped about 300 tons of ore. Development has continued and the mine is in good shape to make a large production in 1883.

The Minnie Hall is on the same vein as the Jimmy Mack. It is owned by the Dwight-Chenoa Mining Company, who also own five claims on Rothschild Mountain. The shaft is down 120 feet on a vein 3 feet wide. The ore is chloride and sulphuret.

The Mayflower and Anna Dedricka adjoin each other on the same vein, which is a true fissure in granite formation. Development work, about $5,000. Each is in shape to produce 10 tons of ore per day. About 25 tons were shipped last year; gave average returns of 188 ounces silver, 1½ ounces gold, and 22 per cent. lead. Average width of vein, 5 feet.

The El Capitan is on West Gold Hill and is owned by Illinois parties. The vein is between 4 and 5 feet wide, and increases in width and richness with depth. It is uncovered at the surface by an open cut, and for a distance of 40 feet shows from 3 to 5 feet in width. The ore is dry, carrying but very little lead, but shows a great deal of silver glance, horn silver, and sulphide of silver, with a little free gold, and is worth from $50 to $700 per ton. The company owns six claims in the immediate neighborhood of the El Capitan. The vein is thought to be identical with that uncovered on the Iron Bonnet, which crosses the Carbonate King, Queen Josephine, Little Elmer, and a number of other claims not sufficiently developed to prove their value.

The Masher, on Emma Burr Mountain, is steadily improving. The ore-body is widening out, and is now between 2 and 3 feet wide, running well in copper, gold, and silver, the average value being about $100 per ton.

Gothic district.—In this district the town of Gothic is at present over the nearest point to the mines of Sheep, Treasury, Bear, Galena, Snow Mass, Copper, Teocolli, and many other mineral-bearing mountains, while Rock Creek, Brush Creek, Crystal, Conundrum, East River, Copper Creek, and other rich basins are best reached from it. Mr. R. J. Walter, of Elko, has furnished me the following information respecting the mines of this district:

Sheep Mountain.—The Grand Republic is one of the first-located mines on Sheep Mountain, being discovered in the spring, having mineral of high grade from near the surface. It is a large vein, carrying antimonial silver, gray copper, and galena. They have shipped ore on jacks, but are now waiting for the completion of the wagon-road from Schofield to near the mine.

The Milwaukee has a large body of high-grade ore, mill runs of 500 ounces silver to the ton being some of the returns. The ore is brittle silver and galena, and with more development it will become one of the best producers in the district.

A group of mines operated by a company, and comprising the Butler Nos. 1, 2, 3, 4, and 5, of which No. 1 has a 110-foot tunnel on the main vein and 75-foot cross-cut to cut another vein of mineral running parallel with main vein. The main vein is 8 feet wide, having streaks of mineral assaying 218 ounces silver to the ton. The small vein, 4 feet wide, has mineral that assays 75 ounces silver to the ton. Butler No. 5 has a 35-foot tunnel, vein 6 feet wide, and the ore assays from 45 to 600 ounces silver to the ton. It is principally brittle silver, galena, and copper.

There are a number of mines superintended by George A. Stone for an Iowa company. Of the different mines the Baby Mine lode has been most developed, having a 120-foot tunnel; the vein is 12 feet wide between walls, average assays being 100 ounces silver to the ton. A large body of mineral and tons of ore on dump.

The General Stone No. 2 is a contact vein lying between quartzite and lime; vein 20 feet wide; has a 75-foot tunnel showing well, with a large body of mineral in sight. There are several tons of ore on dump waiting for a market.

The New York City shows fine galena, with copper, which assays 115 ounces silver to the ton. It has a tunnel 20 feet run in, and a vein of mineral 15 feet wide.

The Gentle Annie is a contact vein between lime and porphyry. It has a 20-foot tunnel and a vein of mineral 4 feet wide. Average assays 56 ounces silver to the ton.

The Belle of Mexico has a large vein of mineral 8 feet wide, principally galena; assays 75 ounces silver to the ton.

The Excelsior was first discovered in the spring of 1882, and is developed by a 10-foot shaft showing a vein of 2 feet in width, select pieces assaying 45 ounces silver to the ton.

The Intermediate has a 20-foot tunnel run in, showing principally galena, assaying on an average 50 ounces silver; vein fully 5 feet wide.

The Thunderbolt is developed by a 25-foot tunnel, showing galena, copper, and iron pyrites; assays 45 ounces silver to the ton.

The Oriental is developed by a 50-foot tunnel; vein of mineral, between walls, 3½ feet wide; assays (select) 75 ounces silver to the ton.

The Carlysle is developed by a 75-foot tunnel showing a 4-foot wide vein of mineral, principally galena, select assays being 125 ounces silver to the ton.

The Quaker is developed by a 20-foot tunnel; has a large vein of mineral, which assays 40 ounces silver, 6 per cent. copper, and 43 per cent. lead.

The Scorpion is developed by a 25-foot tunnel. Pay streak 20 inches, showing pyrites of copper and the oxides of copper and iron, assaying 75 ounces silver and 12 per cent. copper to the ton.

The Mountain Chief has a vein of mineral fully 7 feet wide, assaying from some parts of the vein 100 ounces silver to the ton, the ore showing galena and copper.

The Banker's Daughter has as yet very little development. It has a vein of mineral 12 feet wide, showing pyrites of copper and zincblende.

The Irene is developed by a 60-foot shaft and 40-foot tunnel; vein of mineral 12 feet wide, pay streak 3 feet, showing galena and copper.

The August Flower is developed by a 16-foot open cut; vein 8 feet wide, pay streak 3 feet wide, assaying from 20 to 800 ounces silver to the ton. Ore carries antimonial silver, galena, and heavy spar.

The following-named prospects on Sheep Mountain show some good mineral: The Scottish Chief, Rocky Mountain, Consolidated Virginia, Monarch, Eaton, Detroit, Robert Emmet, Birthday Gift, and others.

Hicks and Bear Mountains.—The Armstrong is developed by a 30-foot tunnel. It has a wide vein, showing galena, copper, and iron pyrites, samples of which assay 75 ounces silver to the ton.

The Crystal Palace is developed by a 14-foot shaft. It has a wide vein, showing principally galena, sample assay of which returns 125 ounces of silver to the ton.

The Pride of the West is developed by a 20-foot shaft; crevice between walls 4½ feet wide; pay streak 18 inches galena and copper.

The Yonker City is developed by a 20-foot tunnel. The vein of mineral is 6 feet wide, showing galena and iron, sample assay of which returns 60 ounces silver to the ton.

The J. J. Hooker is one of different prospects owned by Hooker & Nott. It has been located recently, and as yet has but little development. The mineral shows galena, copper and iron pyrites, zincblende, and specular iron.

The Mary Balcombe has a 15-foot shaft and a wide vein, showing galena, copper and iron pyrites.

The Annetta was discovered last spring. It has a 10-foot shaft; vein of mineral 8 feet wide, pay streak 3 feet, showing galena, copper pyrites, and zincblende, sample assays of which return 50 ounces silver to the ton.

Capital Mountain.—The Pearl Temple is a deposit of iron carbonates newly discovered, carrying gold and silver. It has large bodies of mineral ranging from 2 to 300 feet in width.

Galena Mountain.—The Bobtail, Dora, Anna, Mayflower, and New York claims are all on one vein of mineral, being in places along the vein fully 25 feet wide. The Anna is the middle claim, and, excepting the Bobtail, is the most developed, having a shaft 20 feet deep and 19 feet wide. Mineral taken from different parts of the vein assayed from 8 to 90 ounces silver, from trace to 1 ounce gold, and 28 per cent. copper.

An average assay of the vein was made, which gave in value of gold, silver, and copper $60. These claims were located by D. F. McGlothlan, one of the old pioneers of Gunnison County, in 1872. Very little work was done until 1879, and since then only the annual assessment work.

The Little Giant is developed by a 20-foot tunnel; the vein of mineral is 8 feet wide; the formation slate. It was located in 1873, and there are about 10 tons of ore on dump, which will assay on an average 20 ounces silver and one-half ounce gold. The ore is galena, copper and iron pyrites in quartz.

The Little Pittsburgh is an extension of the Little Giant. It has a 20-foot tunnel and about 12 tons of ore on dump.

The Buster is developed by an 18-foot open cut. The vein of mineral is 12 feet wide between walls of slate, and has about 12 tons of ore on dump, showing galena and iron pyrites, assaying 30 ounces silver and half ounce gold to the ton.

The King has a 40-foot tunnel run in; the vein is a contact between quartzite and slate. There are about 10 tons of ore on dump, assaying on an average 25 ounces of silver and trace of gold.

The Prince of India is located on the northwest slope of Galena Mountain. It is developed by a tunnel of 18 feet. The vein is 12 feet wide; the ore galena, carbonate and pyrites of copper, and arsenical iron, samples of which assay 48 ounces silver, 1 ounce gold, and 26 per cent. copper.

The Homestake was located in 1873. It is developed by a 30-foot tunnel. The vein of mineral is 30 feet wide, between walls of quartzite, and is mostly copper, azurite and malachite, sulphide, quartz, and heavy spar. There are about 35 tons of ore on dump, assays of which being made gave 72 ounces silver, 2 ounces gold, and 24 per cent. copper.

The U. S. Grant is an extension of the Homestake, showing the same vein and character of mineral. It is developed by an 18-foot shaft, and has about 10 tons of ore on the dump.

The above claims are owned by D. F. McGlothlan, who will begin to ship ore from these mines to the Elko concentrator, distant from the mines three-quarters of a mile.

The Four Acres is the next extension to the Homestake, and is developed in three different parts of the vein, showing the same character of mineral.

The Emma is another large vein, being in places 66 feet wide, 26 feet showing fluor-spar intermixed with galena. In the other part of the vein copper and iron pyrites, specular iron, and zincblende are found in large quantities. Assays were made that gave 25 ounces silver, one-half ounce gold, 8 per cent. copper, and 12 per cent. galena.

The Anchor vein of mineral is 10 feet wide, showing the carbonates of copper, azurite, and malachite, iron pyrites, and some galena.

The Blue Wing is developed by a 15-foot open cut. The vein of mineral is 10 feet wide, showing galena, copper and iron pyrites. One assay gave $96 in gold and silver.

The Osceola vein is 6 feet wide, with a solid body of galena 4 feet wide. Assay value 15 ounces silver and 70 per cent. lead.

The Duke of Wellington has as yet but little development. The vein is 5 feet wide, showing galena, copper and iron pyrites. Outcroppings all along the vein.

The Cameron is an extension of the Duke of Wellington, showing the same character of mineral. There are several tons of ore on the dump.

The Alhambra is developed by a shaft of 20 feet. The vein of mineral is 10 feet wide, showing azurite and malachite of copper, copper and iron pyrites, and galena.

The Soledad is developed by an open cut 12 feet. The vein, between walls of quartzite, is 9 feet wide, showing galena, zincblende, copper and iron pyrites, and specular iron.

The Rockaway is developed by a 25-foot tunnel. The vein is about 10 feet wide, between walls of quartzite, showing silicate of copper and galena. It has several tons of ore on the dump, the average value of which is about $40 to the ton.

The Evans is developed by a 30-foot tunnel; the vein is 3 feet wide. Assays made from across the vein return from 9 to 112 ounces silver and 22 per cent. copper.

The Laughing Water is developed by a 100-foot tunnel and a 50-foot shaft. The vein is 12 feet wide; can be traced the whole length of claim. A contract for a further 100 feet of tunnel was signed, and work will be pushed next spring. There are about 30 tons of ore on the dump, the average assay value of which in silver, $20; gold, half an ounce; copper, 14 per cent., and 15 per cent. lead. The ore shows galena, copper and iron pyrites, and zincblende.

The Little Phillis is developed by a 15-foot shaft. The vein is 6 inches wide, showing principally galena.

The Crystal Fountain is developed by a 15-foot tunnel. The vein of mineral is 6 feet wide, pay streak 24 inches, showing galena, copper and iron pyrites, and zincblende. Assay value, gold, half an ounce; silver, 20 ounces; copper, 8 per cent., and lead, 12 per cent.

The Hancock is developed by a 40-foot shaft. The vein of mineral is 3 feet wide, showing galena, copper and iron pyrites, malachite of copper, and zincblende, assaying from 8 to 40 ounces silver, half an ounce gold, 12 per cent. copper, and 10 per cent. galena.

The Pekin is developed by a 25-foot shaft. The vein of solid mineral is 4 feet wide, showing copper and iron pyrites, peacock or variegated copper, and specular iron; average assay value, 15 ounces silver and trace of gold.

The Yeddo is an extension of the Pekin. It has a 15-foot tunnel, and shows the same character of mineral as the Pekin. There are about 3 tons of ore on the dump.

The Triumph is developed by a 60-foot tunnel. The vein is 3 feet wide, showing azurite, malachite, pyrites of copper, and zincblende, assaying from 10 to 40 ounces silver and 16 per cent. copper.

The Monitor is developed by a 40-foot tunnel and a 20-foot shaft. Running tunnel to cut vein at about 60 feet. The vein on surface is 6 feet wide, showing galena, copper and iron pyrites, specular iron, and zincblende.

The Mountain Quail is developed by a 12-foot open adit. The vein is 4 feet wide, showing galena and hematite of iron, carrying gold and silver.

Quite a number of other claims that are staked on this mountain show good minerals. Among them Galena Chief, Little Mamie, Whale, Tanglefoot, Ocean Wave, Keno, Great Eastern, Crystal, Titusville, Bertha, Shetland, Little Annie, Dexter, Elbert County, Kansas, Inter-Ocean, Silver Chord, Milk Maid, Elfin, Jersey, and others.

Gold Basin, at the head of Slate River, and Slate Mountain.—The mines of this basin were first discovered by two prospectors, George Ott and John Nillson. They went to work developing, after making seven locations, naming them the Helvetia, Christine Nillson, Amite, R. J. Walter, Sunny South, Emma, and White Lily, of which the Christine Nillson is most developed by a 50-foot shaft and 30-foot tunnel, showing a vein 3½ feet wide. Assays of from 15 to 80 ounces silver to the ton were taken from the mine. The ore carries galena, copper, and arsenical iron. The Amite has a 25-foot tunnel. The vein is 4 feet wide between walls; the ore carries chloride of silver and fine galena. The others named above are also large veins, assaying from 10 to 60 ounces silver to the ton. The ores carry copper and iron pyrites, galena, and zincblende. Several tons of ore are on the dump.

The Fire Fly has a 20-foot tunnel run in, showing a well-defined vein of mineral 4 feet wide, of galena and hematite of iron, assays of which run as high as 125 ounces silver and 60 per cent. galena to the ton.

The Silver Star adjoins the Fire Fly, and also shows well. The owners, Hopkins, Benton, Crittenden & Co., are negotiating the sale of the above, with the Little Lotta and Little Ida, for the sum of $30,000.

The Chicago and Pittsburgh Gold and Silver Mining Company have located twenty-seven claims, and have paid out several thousand dollars developing the same, doing extensive work on some and only the annual assessments on the others. The company contemplate building a wagon-road up to some of the different mines. There are several tons of ore on the dump.

Mr. G. H. Purington has five discoveries on Slate Mountain, having done only the first assessment of 10 feet on each, of which the Portland and Arlington lodes run parallel with each other, 400 feet apart. Both veins are large, the Portland 4 feet wide and the Arlington 3½ feet, the two carrying galena, copper, and iron, assaying on an average from 8 to 30 ounces silver to the ton. The names of the others are Pythias, Damon, and Fortune, all showing mineral.

A number of mines located by J. Steele & Co., the Mammoth, Paragon, and several others, are looking well, and carry galena, copper and iron pyrites, and zincblende; some of them will, with development, become the best producers in the district.

Payne, Brown & Co. have several locations showing large veins of mineral, carrying galena, copper, and iron; assays vary from 12 to 60 ounces silver to the ton.

The Water Fall is developed by a 15-foot tunnel and 10-foot shaft. The vein between walls of slate is 10 feet wide, showing malachite and sulphide of copper, iron pyrites, galena, and zincblende. Assays made from different parts of the vein returned from 2 to 35 ounces silver, trace of gold, 6 per cent. copper, and 18 per cent. lead. There are about 3 tons of ore on the dump. It is owned by R. J. Walter, who is making arrangements to run tunnel 100 feet, for an interest. There are a hundred or more claims staked in the immediate vicinity, and as yet little work done; some of them, with development, will become producers.

Washington Gulch, between Baldy and Gothic Mountains.—The best developed mine is the Printer Boy, one of a group of mines owned by the Elk Mountain Mining and Milling Company. It has about 600 feet of tunnel and shaft. The vein is 4 feet wide, well defined, showing native and sulphurets of silver and some gold. The company operating this mine are putting up a mill and reduction works, which will be completed next season; they have their ores stored in the ore-houses waiting for the completion of the works.

The Wyoming is developed by a 15-foot open adit. They are running a tunnel down the mountain which will cut the vein at about 150 feet. Assays made from mineral of open adit gave from 20 to 420 ounces silver to the ton, ore showing chloride of silver and copper.

A number of other claims in this gulch have been worked considerably, and several tons of ore are on the dumps of the different mines, among them the Washington, Stockholm, Broad Gauge, and others. There is a placer claim worked with profit to the owners every season in this gulch.

Paradise Gulch, between Baldy and Cinnamon Mountains.—The Pennsylvania is developed by a 50-foot shaft and a tunnel of 40 feet. The vein is 4 feet wide between walls, showing galena and cerussite crystal; average assay 60 ounces silver and 65 per cent. lead to the ton.

The Val Verde is developed by a 100-foot shaft. The vein of mineral is 5 feet wide, showing mostly galena and fluor-spar, copper and iron pyrites.

The Game Cock is developed by an 80-foot tunnel. The vein of mineral is 3 feet wide, showing galena, copper and iron pyrites; assays from 8 to 30 ounces silver and some gold. There are 5 tons of ore on the dump.

The Cinnamon Mountain Mining and Milling Company are operating a group of mines, of which the Golden is most developed. A contract was let to run a tunnel 500 feet; it is now in 240 feet, showing a well-defined vein of mineral 5 feet wide between walls of slate. There are several tons of ore in ore-house, which will be hauled down to the concentrator at Elko next spring, a distance of three-fourths of a mile. The Pacific, Buckeye, and four other claims of this group will be more developed next season.

The Beaumont is developed by a tunnel 40 feet in. The vein is about 4 feet wide; looks promising. Returns as high as 400 ounces of silver to the ton were made.

The Spendthrift is opened by an incline 30 feet in. The vein is 3 feet wide, showing galena and oxide of iron, assaying on an average 50 ounces silver and 60 per cent. lead.

There are a number of prospects owned by J. T. Rodriguez in this gulch, all showing mineral, assays ranging from 2 to 40 ounces silver, trace to 1½ ounces gold. The ore carries galena, copper and iron pyrites, zincblende, and specular iron. The names of the different prospects are Rosa, Saint Mary's, Saint Joseph, White Lily, and Holy Cross.

Col. T. E. Boyd has several claims in this gulch showing well.

The Red Gauntlet is developed by a 40-foot tunnel. The vein is about 3 feet wide, showing galena, hematite, and oxide of iron.

The Stalwart and Lee mines look promising.

There are quite a number of other claims staked in this gulch, all carrying more or less gold, and with development undoubtedly will show up well.

The Adrien is developed by a 60-foot tunnel. The vein is 4 feet wide, first-class ore, showing galena, gray copper, copper and iron pyrites; mill run, 144 ounces silver, trace gold, 28 per cent. copper.

The Wicklow, Jenny Lind, Busted Extension, and others show good mineral.

The Eureka, on Treasury Mountain, has produced more than any other mine in that locality. About 10 car loads of ore of various grades were shipped to the Boston and Colorado works at Argo, the average returns of which were $90 for gold, silver, and copper contained. The galena and antimonial silver ores were shipped to Meyer's smelter, near Kansas City; the average returns were 20 ounces of silver per ton, and 60 per cent. of lead. The mine is owned by the Gunnison Silver Mining Company. It is situated upon the top of the mountain, and the shafts and tunnels developing it show large bodies of ore. Substantial shaft and ore houses have been erected.

The Garfield, on the same mountain, is developed by a 30-foot tunnel, exposing a wide vein of galena, copper, and specular iron, assaying from 10 to 95 ounces of silver and 12 per cent. of copper.

The Shakespeare promises to become a large producer, showing a large amount of high-grade mineral. It is owned by the Central Mining and Milling Company, which has a concentrator at Elko, 2 miles from the mine, with which it is connected by a good wagon-road.

The Buffalo, near the Eureka, has a 4-foot vein of galena, copper, and hematite, from which assays have been made yielding from 25 to 480 ounces of silver to the ton.

The Comstock is developed by a 40-foot tunnel on a vein of galena, malachite, pyrites of copper, and zincblende, assaying from 20 to 90 ounces of silver to the ton. Several tons of ore are on the dump.

The Burpee has a 6-foot vein of mineral of the same character as that of the Comstock, and is opened by a 50-foot incline. The ore assays from 15 to 60 ounces of silver to the ton, with a trace of gold.

Other prospects on this mountain which show good mineral are the Whale, Quaker City, Iron Hand, Raymond, Jewett, Evening Star, Fort Benton, Hicks, Murphy, Alice Taylor, and Nevada.

On Crystal Mountain, the Crown is developed by a 40-foot shaft on a 6-foot vein of malachite, galena, and oxide of iron. About 2 tons of ore are on the dump.

The Bunker has a 14-foot shaft on a vein of galena, copper and iron pyrites 5 feet wide, and assaying from 8 to 20 ounces of silver per ton.

The High Tide, Helvetia, Melrose, Hamilton, Rochester, Cataract, Bon Ton, Independence, and Low Tide, all show veins of good ore.

The Mammoth Cave, on Mineral Point, is developed by a 60-foot tunnel on a strong vein of galena, copper, iron, and zincblende.

The Lost Horse is a new discovery, on which only assessment work has been done; the vein is 3 to 4 feet wide, with an 18-inch pay streak, assaying 54 ounces of silver to the ton. The ore is copper, galena, and blende.

The Brooklyn No. 1 shows a large vein, assaying 40 ounces of silver. The Old Missouri has a tunnel 30 feet in length. There is a 15-inch pay streak in a 3-foot vein of galena, copper, and zinc.

The Berry and Ellis is opened by a 55-foot tunnel; the vein is 3 feet wide with a pay streak of 12 inches, which assays 190 ounces of silver.

Other prominent claims are the Belle of the West, Keystone, Buckeye Boy, Anna Lee, and C. W. Givens.

Some rich discoveries were made late in 1881, upon what is known as the Carbonate belt, which has been traced for about 20 miles, and is a half mile in width. The ore-bodies, composed of iron carbonate, galena, and fluor-spar, are from 4 to 300 feet in thickness, and lie between lime and porphyry. Assays have been made yielding in some instances as high as 80 ounces of silver and one ounce of gold to the ton.

The chief claims located are the Hidden Treasure, Bonanza, Iron Crown, Thomas Paine, Baby Mine, Queen of Diamonds, Miner Boy, Corwin, Magnetic, Excelsior, Mountain View, Golden Crown, Golden Eagle, and Mountain Lion.

Large bodies of magnetic iron ore are found near this Carbonate belt that will average 72 per cent. of iron.

The production of gold and silver from the mines of Gunnison County in 1882 approximated $100,000 in gold and $500,000 in silver.

HINSDALE COUNTY.

The following sketch of Hinsdale County and its mines was contributed by Moritz Stockder, M. E., of Lake City:

The county of Hinsdale was, up to the ratification of the treaty with the Ute Indians, in 1872, a portion of that San Juan country which embraces the entire mineral-bearing region in the southwestern part of the State of Colorado, and which has since been divided into Hinsdale, Ouray, San Juan, La Plata, and Dolores Counties.

Hinsdale County is bounded on the north by Gunnison, on the east by Saguache and Rio Grande, on the south by Conejos, and on the west by La Plata, San Juan, and Ouray Counties. The area of this county is about 1,500 square miles, of which about one-fifth, the northwestern portion, comprises what may be termed mineral-bearing region, with nearly 3,500 mining locations recorded at the county clerk's office. Upon these mineral riches the county is altogether dependent, as there is but very little arable land, probably not more than the acreage of a good farm in Illinois. Timber and water, almost as essential to the success of mining enterprises as is good ore, are abundant.

The mineral portion proper of Hinsdale County is drained by the Lake Fork of the Gunnison and Henson Creek, with their tributaries. Wagon-roads along these two streams, with many branches, form the main outlets for all the mineral products drained by the above streams.

The amount of water, passing the Argenta Falls of the Lake Fork of the Gunnison, some 3½ miles south of Lake City, was determined by me last year in September at 98 cubic feet per second. Henson Creek, above its junction with the Lake Fork, furnishes at least this same amount. There are plenty of opportunities for utilizing this water-power, as both streams occasionally widen out into parks; they have also considerable fall, about 100 feet per mile on the average. Of great importance to our mining industry are also the deposits of iron ore suitable for fluxing, which occur in extensive beds in many places around Lake City.

Lake City is the county seat, and is situated near the junction of Henson Creek with the Lake Fork of the Gunnison. The distance to the nearest railroad station of the Denver and Rio Grande Railroad, Sapinero, on the Gunnison River, is 35 miles; to Del Norte, at present railroad terminus on the Rio Grande River, it is 50 miles.

This northwestern section of Hinsdale County is traversed in every direction by mineral-bearing lodes, true fissure veins which in many places form a regular network. There is every reason to believe that they are practically unlimited in depth, for many of them can be traced in horizontal direction for miles; besides, recent development demonstrates this assertion fully. The width of these veins is from 3 to 4 feet on the average and varies between 2 and 10 feet. The ores of these metalliferous veins are most commonly the metallic sulphides; gold, silver, and copper are also found as pure metals. The principal vein materials are quartz, sulphate of baryta (heavy-spar), and carbonate of lime (calc-spar).

The country rock of this mineral-bearing region is highly metamorphosed, and consists of granite, trachyte, and diorite, all of them belonging to the group of unstratified or igneous rocks.

The northwestern portion of the county is divided into four mining districts, Galena, Lake, Sherman, and Park.

Galena district comprises, as its name indicates, veins of principally argentiferous lead ores (sulphide and sulphate of lead) generally ac companied by auriferous copper and iron pyrites, gray copper, zincblende, and quartz.

The best representatives of veins of the above character are the Ute and Ulé mines on Henson Creek, 3½ miles west of Lake City. Both are very large veins with an average of 3 feet of ore, which toward depth has increased remarkably in value. There are several thousand feet of development shafts and drifts on the mines. The main shaft on the Ulé has reached a depth of 410 feet. During last year extensive concentration works have been erected at the openings on the Ulé, which have proven to be a complete success. Their capacity is 150 tons of ore per day, affording also a good opportunity for treatment of similar ores from foreign mines. In connection with these mines are the smelting works near Granite Falls, one mile south of Lake City, with a present capacity of 35 to 40 tons per day. The property is owned by the Crooke Mining and Smelting Company, Limited, London. During a time last autumn, 230 men were employed at mine, concentrator, and smelter. The mines have been worked for the greater part of the year and have produced over 8,100 tons of ore, of which 3,750 tons have been treated at works. A number of Ingersoll drills are employed in the mines.

The following were the average wages paid at the mine:

	Per day.
For good miners	$3 50
For mechanics	$4 00 to 4 50
For top hands	3 00 to 3 50

And at the works:

For millmen	3 50 to 4 00
For mechanics	4 00 to 4 50
For foreman	4 50 to 6 00
For ordinary help	3 00 to 3 50

The above figures of wages for labor may be considered an average for the entire section.

The California lode, recently named Compromise, is a northeast extension of the Ulé. The development consists of a drift 90 feet long with winze of 60 feet, connecting with the surface, and several other shafts and open cuts. There is also a cross-cut 65 feet in length. The mineral body exposed in these workings averages fully 2 feet in width; sometimes the ore-body assumes dimensions of 4 and even 6 feet. The mineral is precisely of the same character as that in the Ulé in the upper workings, and will no doubt carry more gray copper toward depth.

The Lightning Striker is another extension of the Ulé, and to describe it would be merely a recapitulation of the foregoing. On account of litigation, nothing but assessment work has been done in the year.

Some 4 or 5 miles further west along Henson Creek we find another group of good galena and gray copper lodes, comprising the following claims: The Ocean Wave, Wave of the Ocean, Red Rogers, El Paso, J. J. Crooke, Burro *et al*, on the north side of the creek, and the Big Casino, Pride of America, Phœnix, Ottumwa *et al.*, on the south side of the creek.

Nothing but assessment work has been done on these properties for the last year, most of them being in litigation, but the mines of this group may be considered very valuable.

In the Ocean Wave the vein is about 3½ feet wide, with 10 to 12 inches of splendid mineral, principally gray copper and galena. Up to the year 1880, the total product of this mine, treated at the Ocean Wave works, was 110,000 ounces silver. Since that time mine and works have been idle. The present development consists of three levels of 150, 200, and 460 feet in length, several connecting winzes, and considerable stoped ground.

The Big Casino, Pride of America, and Phœnix are all on the same vein, which is about 6 feet wide, with 2 feet of mineral, galena and gray copper.

The development on the Big Casino consists of a cross-cut tunnel, 40 feet, with connecting drift and shaft, both 50 feet. In former years a small number of tons of ore has been shipped, giving an average of 32 ounces silver and 50 per cent. lead.

Further west along Henson Creek, and in the immediate vicinity of Capitol City, some 10 miles distant from Lake City, a number of good prospects are located and being worked.

On Yellowstone Mountain is the Czar lode, a vein from 4 to 6 feet wide, with 1 foot of heavy galena ore; development, 56-foot shaft.

The Czarina, parallel to the Czar, is also a large vein, carrying galena and copper pyrites.

The Silver Chord is developed by a shaft of 80 feet, showing a pay streak varying between 12 and 18 inches of galena and yellow copper; the vein is about 4 feet wide.

The Silver Chord Extension, at the head of Yellowstone Gulch, has a cross-cut of 157 feet, shaft of 100 feet, and drifts from bottom 100 feet each way. The ore streak varies from 3 to 18 inches, and consists of gray copper, galena, copper and iron pyrites, and sometimes wire silver.

Opposite the Silver Chord, on the north side of the gulch, is the Yellow Medicine, with a shaft 75 feet deep, cross-cut 45 feet, with connecting drift of 130 feet. The vein carries from 18 inches to 2 feet of good mineral galena, gray copper, zinc blende, copper and iron pyrites, some of it assaying as high as 150 ounces silver per ton.

The Capitol City and Capitol City No. 2 are located on the same vein, which is about 5 feet wide, with a mineral streak of from 20 inches to 3 feet, consisting of galena, zincblende, iron and copper pyrites, yielding about 20 ounces silver and 50 per cent. lead per ton. The shaft on the Capitol City is 117 feet deep, the drift 257 feet.

The Lily is the south extension of the Capitol City lode, developed by a drift of 140 feet and several other openings. In this mine there is considerable gray copper mixed with the ore. A mill run of 1½ tons of ore gave the following return: Gold, .06 ounce; silver, 152 ounces; and copper, 4.8 per cent. per ton. The ore streak varies between 6 inches and several feet.

The Young America is developed by a shaft of 185 feet, with several small drifts. The mineral, consisting of gray copper, galena, &c., is generally interspersed and impregnated through the vein matter.

Opposite the mouth of Yellowstone Gulch, between the North and South Forks of Henson Creek, and about one mile west of Capitol City, are the Sunshine and Capitol Mountains, containing, among others, the following well-known mines:

The Moro lode, with several hundred feet of development drifts and shafts, and an average of 2 feet of ore, in places widening out to 4 feet, principally gray copper and galena.

The Moro No. 2 is the northeast extension of the Moro, with 3 feet of galena, gray copper, and copper pyrites, impregnated through vein matter; development, 50 feet drift.

The Paymaster is an extension of Moro No. 2.

Very close to the Moro, and parallel with the same, is the Capitol lode, a large vein, with 2 feet of high-grade galena and gray copper ore; there are several hundred feet of drifts on this vein.

The ores of all these lodes carry, besides silver, not an inconsiderable portion of gold.

A little lower down the mountain slope towards Henson Creek is the H. M. Woods, another heavy galena lode, with about 2 feet of ore, sometimes nearly solid; development, 150 feet drift.

The Anchor is a southwest extension of the H. M. Woods.

The Hellespont, in that vicinity, is also a very fair prospect.

Opposite, and to the south of Capitol Mountain, are the claims of the Wisconsin and San Juan Mining Company, five in number, the Little John, Ellwood, Sycamore, Postal, and Lone Tree, all large veins, being developed by a cross-cut tunnel, now in 350 feet.

In Galena Gulch, south side of Henson Creek, there are situated the Silver Crown, Silver Wave, and Blue Wave lodes.

The Blue Wave is located on a vein 6 feet wide, with 2 feet solid, but low-grade galena ore. It is developed by a shaft 45 feet deep; and a cross-cut tunnel of 65 feet, which has now reached the vein; nearly 10 tons of ore were taken out in crossing the vein from wall to wall.

A little further west, and on the north side of Henson Creek, we find the well-known galena lodes on Sheep (Galena) Mountain, among which the Independence is the most prominent. This vein is about 5 feet wide, with an average of 2½ feet of ore, principally galena and copper pyrites, no zincblende, sometimes filling the entire 5 feet between walls. The ore averages about $50 per ton. Sixty-five tons of ore were shipped last year, which netted the owners $1,010. There is a drift on the vein 232 feet in length.

The Highland Chief and Incas are extensions on this vein, similar in character to the Independence.

The High Muck y Muck, Empire, and U. S., &c., are good prospects in the same vicinity.

Not far from the Henson Creek toll-road, on the lower slope of Sheep Mountain, is the Morning Star, with considerable development, lower drift 150 feet, a large vein, with galena, gray copper, and zincblende interspersed through vein matter. Small lots have been shipped to smelting works, but the ore (unassorted) proved to be of too low a grade for profitable development.

In Schafer Basin, opposite Sheep Mountain, and on the south side of Henson Creek, is another group of heavy galena lodes.

The Joaquin is developed by a drift of 60 feet in length, exposing an almost solid ore-body of 18 inches to 2 feet in width, consisting of galena, copper pyrites, and zincblende, low grade in silver.

The May Queen, Sonoma, Mountain King No. 1, Mountain King No. 2, and others, belong to this group.

Horseshoe Basin on the west adjoins Schafer Basin; here the Maple Grove and others are located on a large vein with about 18 inches of low-grade galena ore. The mines in this basin are but slightly developed.

Near Rose's Cabin, 15 miles west of Lake City, the mineral character of the veins seems to have changed together with the country rock; whereas the above galena lodes along the middle and lower part of Henson Creek occur in a trachytic formation, the country rock around Rose's Cabin and near the headwaters of Henson Creek consists of diorite, melaphyse, and some porphyry.

On Copper Hill, one mile north of Rose's Cabin, the veins are numerous, but small; they carry principally copper glance, high grade in silver, usually combined with azurite and malachite, and sometimes native copper. The ore streaks (rather seams) are very small, seldom over seven inches in width.

Next to Copper Hill lies the Dolly Varden, and higher up the Frank Adams, but nothing else than assessment work has been done during last year.

On Engineer Mountain, at the headwaters of Henson Creek, most of the large fissure veins carry high-grade silver ores, consisting of ruby silver, antimonial silver, gray copper, and iron and copper pyrites impregnated through vein matter.

The best developed mine is the Palmetto, with several thousand feet of shafts and drifts. During the first half of last year 400 tons of ore were extracted and treated at the Palmetto works by the amalgamation process, yielding $14,840. Since July, mine and mill have been lying idle, together with the Ruby Queen and First National, all on the Palmetto vein and belonging to the Palmetto Consolidated Mining Company.

Several other extensions are on this large vein, viz, the Miner's Bank, Polar Star, and others, lying across the range in San Juan County.

The Polar Star has been steadily developed, and considerable of its ruby silver ore has been treated at Crooke's works with splendid returns.

The Carbonate Queen, Chimney Corner, Hoffman, Emperor William, Wyoming, Watson, and Ophir are all promising prospects in that section.

But the chief among the Engineer Mountain properties is the Frank Hough mine, which was discovered early last January. It is no fissure vein, but one of those large and irregular bodies of copper ore such as are known to exist at Fahlun in Sweden and other parts of the Old World, where they have been worked with profit for many centuries. The ore is a copper ore, composed of a thorough mixture of gray copper, copper pyrites, and iron pyrites. Occasionally some galena is found within this copper matrix. The ore occurs in solid, large, and irregular bodies, often separated and intersected by small and large talcish and chloritish fissures, traversing in every direction. The average value of the ore at present exposed is from 50 to 60 ounces silver, a trace to 1 ounce of gold, and 20 to 28 per cent. copper per ton. Sixty tons of ore were shipped late last year, with an average value of about $125 per ton.

The development on the Frank Hough mine consists of a shaft 250 feet deep (for the greatest part of its length piercing through the ore-body), with four drifts, started from the shaft at 50, 80, 140, and 200 feet below the surface. The upper drift exposes 12 feet of solid ore; the second drift, 17 feet; the third drift, 25 feet; and the lowest drift has been run for 57 feet in a solid ore-body. Over 100 tons of ore were extracted from this lowest drift.

A good deal of prospecting was done in that vicinity during last year, most of the prospectors believing the Frank Hough ore-body extending as a layer in horizontal direction, but all finally became discouraged, failing to discover the layer, or deposit, as they termed it, within 50 feet from the surface.

The only discovery made was on the other side of the divide, some 2,000 feet northwest of the Frank Hough, but in Ouray County, in what is known as the U. S. claim. Here, although in no connection with the Frank Hough, exactly the same ores have been found, some 10 feet below the surface, but as yet not enough development has been done to determine the value of this discovery. It is very likely, however, that ere long more of these irregular bodies of copper ore may be found in the neighborhood of the Frank Hough. This belief is greatly strengthened by the recent discoveries of the Red Mountain district, Ouray County, which, if they do not eclipse, surely equal those in the Frank Hough.

Before leaving Galena district, I will mention in connection therewith the Cimarron gold mines, which as yet have been tributary to Lake City. They are situated on the headwaters of Cimarron Creek, on the northern slope of Uncompahgre Peak. It seems to be a system of lodes, entirely different from any other around here, but very similar to the famous gold-bearing veins near Central and Black Hawk in the northern portion of this State.

The Cimarron vein is several feet in width, filled with a feldspathic vein matter, through which free gold, but especially auriferous iron pyrites, is finely distributed, yielding on an average about $20 to $30 per ton. As yet but very little development has been done in that section. The prominent veins are the Conkling, Euphemia, Western Slope, Little Monarch, Lucy R. Singleton, Saint Louis, Globe, and others. As yet there are no proper works for the treatment of these ores erected anywhere near the mines, which causes to a great extent the delay in development.

Alpine Creek is the largest tributary to Henson Creek, and joins the latter about 3 miles west of Lake City. Here several claims have been developed into good prospects during the year.

The Michigan is located on a 4½-foot vein, with gray copper (of very high grade in silver) auriferous copper, and iron pyrites scattered through 4 feet of vein matter. The average value of the ore across these 4 feet is from $30 to $35 per ton, which will yield a good profit as soon as the ore can undergo the process of concentrating at suitable works. The mine is developed by a drift of 54 feet and a shaft of 10 feet.

Further up Alpine Creek are the Florida, Tallahassee, and St. Gothard galena lodes, and near its headwaters the Sweet Home, Owl, and others, very large veins, with considerable gray copper impregnated through vein matter.

Very similar in character to these gray copper lodes are the Hannibal and Pacific, near Snowden's Cabin, on the Henson Creek road. These claims show a large body of quartz, impregnated with gray copper, along the surface, in places some 6 feet wide. They are under development by a cross-cut tunnel, now in 60 feet.

Park district embraces the country around the headwaters of the Lake Ford of the Gunnison River. The country rock consists mainly of granite.

In Cleveland Gulch, among others, the following properties are located:

The Bourbon County, a heavy galena lode about 3 feet wide, with from 1 to 2 feet of low-grade galena ore; the development consists of a 50-foot shaft.

The Highland Mary vein is about 10 feet wide with 2 feet of ore, galena, and gray copper; development, shaft, 15 feet deep.

The Anchor is an extension of this claim, with but little development.

The Cashier has some 150 feet development, exposing one foot of galena and copper pyrites ore.

The Irish Queen and City of Paris are also galena lodes.

The Inez is a largely developed property, carrying high-grade silver ores, but in small quantities.

The Detroit, City of New York, Belcher, Sultan, are all fair prospects.

In the Park proper there are located:

The Champion (formerly known as the Del Norte), a large vein with principally low-grade copper and iron pyrites. It is developed by a shaft of 115 feet, and an open cut.

The Seward County carries gray copper, copper and iron pyrites, and zincblende; shaft down 165 feet.

The Royal Charter carries a 20-inch pay streak of galena ore in a 3-foot vein. Shaft 20, drift 15 feet.

The Red Gulch is another galena and copper pyrites vein; the ore is found in large pockets, often over 7 feet in dimensions.

The U. S., on Cooper Creek, shows brittle and ruby silver, gray copper and iron pyrites interspersed through a 5-foot vein; the development consists of two shafts 30 and 50 feet deep.

The Daisy, also on Cooper Creek, is an extension of the U. S., developed by 10 and 20 feet shafts.

The Silver Star lode is 5 feet wide, and carries gray copper and galena in quartz; drift 25 feet.

The Grand Central is located on a 4-foot vein, with gray copper, galena, and iron pyrites in vein matter; shaft 50 feet.

The Earl, an extension of the Grand Central, is developed by a cross-cut of 115 feet and drift of 15 feet; shows 4 feet of mineralized quartz.

The A No. 1, near the White Cross post-office, is a vein about 3 feet wide, carrying considerable quantities of gray copper; shaft 100 feet deep.

In American Basin the following mines are situated:

The Oneida is located on a 10-foot vein, with galena and copper pyrites interspersed through quartz; development, drift 40 feet.

The Flower of the West is being under development by a cross-cut tunnel, now in 250 feet.

The American Eagle is developed by a shaft of 50 feet; character of the ore, gray copper, high grade in silver.

The Pittsburgh carries galena and copper pyrites.

The Andy also carries galena ore; drift, 50 feet.

The Crown Point, Gnome, Bonhomme, Addie Lovell, Pelican, and Hidden Treasure, are all promising prospects, located in that vicinity.

Sherman district.—Throughout this district granite is the prevailing country rock.

The best developed mine is the Black Wonder, situated near the town of Sherman. It is a large vein, or rather dike, where high-grade silver ores (silver glance) have occasionally been found. The development consists of a cross-cut tunnel 250 feet in length, with two drifts, 50 and 150 feet, and a shaft of 70 feet. Work on this mine, which, together with the George Washington, is owned by the Black Wonder Consolidated Mining Company, has been suspended for over a year.

The Black Wonder No. 2 has a shaft 10 feet deep, and a tunnel of 35 feet, and is an extension of the Black Wonder.

The George Washington vein is from 7 to 8 feet wide, well defined, with a small streak of from 2 inches to 12 inches of high-grade silver and gold ore. The development consists of two drifts, 80 and 150 feet in length. This mine has also been lying idle for some time past. In 1879 the first two tons of ore were shipped from this mine, which netted over $1,300.

The Mountain View lode is 5 feet wide, with 2 feet of ore, galena and yellow copper; shaft 200 feet.

The Mammoth, Monster, and Wolverine are all large lodes, with from

20 to 80 feet of development, situated in the immediate vicinity of Sherman.

On the South Fork of Cottonwood Creek are located:

The Minnie Lee, a ruby silver lode, about 3 feet wide, with high-grade silver mineral and auriferous iron pyrites scattered through the quartz. The development consists of a drift 30 feet long.

The Irish World, opposite to the Minnie Lee, being under development by a cross cut tunnel, now in 100 feet. The vein is large, and carries gray copper, copper pyrites, iron pyrites, and zincblende.

The Dolphin shows about 3 feet of good mineral galena and copper and iron pyrites, low grade; shaft 50 feet.

The Cuba is a large quartz vein, with ruby silver and auriferous iron pyrites; shaft 25 feet.

The Vermont is located on the North Fork of Cottonwood Creek. It is a galena and gray copper vein; 130 feet drift and cross-cut.

The new Carson mining camp was discovered last year. It is situated some 5 miles southeast from Sherman, across the Continental Divide, on the headwaters of Lost Trail Creek, a tributary of the Rio Grande River.

The following-named claims may be considered fair prospects:

The Dunderberg, George III, Bonanza King, Cresco, Saint Lawrence, Jumbo, Orphan Boy, Yreka, Daniel Morgan, Kit Carson, Ohio, Silver Spray and Overland. Ores: Iron pyrites, galena, zincblende, gray copper, &c.

Lake district.—Lake City is the central point of Lake district; all the prominent mines are within a radius of 4 miles. The country rock consists of a highly metamorphosed trachyte.

On Hotchkiss Mountain is the only place in Hinsdale County where tellurium ores occur in paying quantities. Although the existence of these rich ores has been known for the past six years (mention thereof is made in Hayden's United States Geological Report, 1876), yet there has never been an effort made for the purpose of successfully operating and developing this interesting locality.

The mines are situated on the eastern slope of Hotchkiss Mountain, near Lake San Cristoval, and about 4 miles south of Lake City. The group comprises four or five lode claims, one parallel to the other, which, it is judged, will cover the area of the telluride belt. The country rock, according to Professor Endlich, is propylite, of the trachyte series, generally termed greenstone trachyte, the bearer of telluride of gold and silver ores. These ores occur in a contact formed by light trachyte on the lower end and by propylite on the upper part; 300 feet may be regarded as its maximum thickness.

The contact mass is composed mostly of bowlders and sharp fragments (breccias) of every size, cemented together by soft, clayish, and feldspathic matter. As to their nature, these breccias consist of fragments of the underlying rocks, but in a greater proportion there are contained those of quartz and hornstone. Among these latter there are found the above high-grade ores, telluride of gold and silver, irregularly distributed, as small seams, surrounding the breccias, or in streaks and small fissures, generally scattered through the fragments.

These mineralized quartz and hornblende breccias invariably yield extraordinary high returns. Owing to the wide dissemination of the telluride bowlders and breccias through the contact mass, this entire body, taken as a whole, is naturally of low grade, but its vast amount affords at the same time a good chance for the right kind of concentration works.

The Plutarch is situated near the Lake Fork of the Gunnison; but little development was done during last year, although the mine has produced some very rich gray copper ore.

The Mayflower has considerable development; it carries gray copper, copper and iron pyrites, and zincblende in a 2-foot quartz vein.

The Silver Coin shows some good gray copper and galena ore; it is a large vein and was a large producer in 1875 and 1876, but lately only assessment work has been done.

The Goshen and Minstrel Boy carry some very high-grade silver and gold ores; development consists of 90 feet drift and several shafts 30 and 40 feet deep.

The Nellie M. and Monte Queen, near Crooke's Works, are promising prospects; they are under slow but steady development.

The Excelsior and Fanny Fern carry gray copper ore, mixed with galena, copper and iron pyrites, and zincblende. They are developed by shafts 30 and 60 feet deep.

The Mountain Chief is being steadily developed; several lots of ore were shipped last year, yielding $125 per ton. It is being steadily worked.

The Mount Morris has a shaft, some 60 feet deep, with galena ore.

The Pomeroy lode is about 2 feet wide, carrying gray copper and copper pyrites in quartz and heavy spar; shaft 100 feet deep.

The Highland Mary and Dolphin, above Crooke's Works, show very nice galena and gray copper ore.

Work on the Sulphuret and Cora was suspended early last year; they are promising properties.

The Golden Wonder and Golden Mammoth have also been lying idle during the year.

The Belle of the West group of mines comprises five or six claims, all situated closely together, about 3 miles south of Lake City. The best developed mine of this group is the Belle of the West, which has been steadily producing. Seven hundred and fifty tons of ore have been shipped since its discovery, yielding an average of 101 ounces silver per ton. The ore consists of gray copper, copper and iron pyrites, galena, and zincblende. The average width of the ore streak throughout the workings is from 18 inches to 24 inches. In places the ore is found fully 5 and 6 feet wide. The development consists of nearly 2,000 feet of drifts and shafts.

The Belle of the East adjoins the Belle of the West; both lodes are parallel to each other and very similar as to the character of the ore, width of pay streak, &c. The development consists of several hundred feet. Small quantities of ore were shipped during the year.

The following have been the producing mines: The Ute, the Ulé, Palmetto, Ruby Queen, First National, Frank Hough, Belle of the West, Belle of the East, Mountain Chief, Independence, Morning Star, Wyoming, and Polar Star.

Hinsdale County produced in 1882 $20,000 in gold and $80,000 in silver.

LAKE COUNTY.

The condition of the mining industry during the year in Lake County was prosperous, and at its close the prospects for the future were highly encouraging. There was a notable increase in the production over that of the preceding year. A number of mines which had been only in course of development, or which had been worked in a desultory manner, have become profitable producers and regular shippers of ore.

Some of the oldest mines, which it was thought in 1881 were commencing to show signs of exhaustion, have opened new and rich ore-bodies, and are in a better condition than ever before.

The continued prosperity of the better known portions of the belt has stimulated prospecting, not only in the immediate vicinity of the older mines, but in new localities which formerly were regarded as of little promise, if not altogether barren of mineral.

The discoveries and developments of the year tend to prove that the principal mineral belt on which the great mines are situated is of much greater extent than has been hitherto supposed.

On *Fryer Hill* great activity prevailed. The oldest mines showed some little weakness, but those toward the east end, embracing the Robert E. Lee, Matchless, Little Silver, and others, have developed very extensive bodies of high-grade chloride ore.

In addition to a continuation of operations in the few large mines which have made such enormous production of bullion, scores of new shafts have been at work. A large part of the work is done by tributers, and old abandoned shafts and stopes have been again opened and worked by practical and adventurous miners who are taking chances in extracting ore overlooked in former times, or in exploiting for new and rich ore-bodies.

The Chrysolite Consolidated Mining Company own seven locations on the northwestern part of Fryer Hill, comprising Chrysolite, Vulture, Carboniferous, Kit Carson, Fair View, Colorado Chief, and Muldoon, all adjoining.

The company was organized in 1879 with a capital of $10,000,000. Previous to the property passing into the hands of the company it had produced about $1,000,000. The main shaft, known as the Roberts shaft, is connected with all the workings and has been used chiefly for the raising of ore. The mine has paid in dividends to original owners and to the company over $3,100,000 in clear profits. For the last year the output has been small, but still a large amount of territory remains unexplored. The property is pretty well covered by leases, and no less than half a dozen shafts on the territory are being worked, while one or two lessees are hoisting through the Roberts shaft, where the company are also hoisting some ore. The company is still engaged in pushing work on the incline from the Colorado Chief No. 2 shaft, and a small streak of pay ore has been disclosed in the second or lower body of iron, but no pay. Recent developments confirm the statement that there are two distinct bodies of iron in this portion of Fryer Hill, being separated by 80 to 90 feet of sedimentary and eruptive rock.

According to the annual report, there were driven during the year 13,499 linear feet of timbered drifts, 1,413 feet of winzes and rises, and 99 feet of shafts; 10,774 tons of ore sold netted $401,816.89, or $37.29 per ton. The total expenditure at Leadville was $397,751.60, or $36.63 per ton of ore shipped. Per foot of linear drift, &c., the expense was $26.49, against $32.08 during the previous year. A much larger amount of dead work was therefore done, while on the other hand the quality and grade of the ore were lower, and were made more expensive to work, by the necessity of careful hand sorting. The cash surplus on October 8, after the payment of the September expenses was, at New York, $215,694, and at Leadville, $4,339; a total of $220,034. The surplus on October 8, 1881, was $490,056, from which $300,000 was paid in dividends. The operations of the year from October 8, 1881, to October 8, 1882, therefore resulted in a profit of $29,978, to which may be added $6,000 paid in settlement of the "$15,000 unsettled claims" reported last year, and $2,500 paid for property, making $38,478 profit apart from the money spent on new machinery and permanent improvements. The management is engaged in putting fire-proof iron doors in all shafts, and taking other well-advised precautions against a fire, or repetition of the severe disaster which overtook the company some two years ago.

The surface improvements are of the best character. Over the Roberts shaft is one of the finest mine buildings in Colorado. The main shaft-room is 40 by 40 feet in size, and is the center room of the building. On the south side is the machine and blacksmith shop, 35 by 35 feet in size. The timbering room is on the north end, and is 35 by 60 feet. On the east are the engine and boiler rooms, separated by a partition, the former being 24 by 48 feet and the boiler room 20 by 40 feet. The large new ore-house, 22 by 50 feet in size, has just been completed, and is 60 feet from the main building, connected therewith by a bridge, over which are laid rails, and the cars coming from the mine are wheeled directly into the ore building, where they are dumped into the different bins. The entire buildings are most substantially built of the heaviest timbers, and everything put up for permanency.

The engine is 60 horse-power, with a Corliss frame of the improved pattern. The foundation is built of stone, and has a depth of 9 feet. The boiler measures 52 inches in diameter and 16 feet in length, and is furnished with a large dome and mud-drum. It has forty-four 3½-inch flues, and is set in brick. In the shaft, which is of three compartments, two safety cages are run, the third being used for a pump and ladder way.

During the year the company erected an experimental mill for concentrating low-grade ores, and although the machinery is in very imperfect running order it nevertheless demonstrates that the Leadville ores can be concentrated with sufficient success and economy to insure a profitable enterprise. The percussion tables and sizing machine have not been in use so far, owing to some irregularity in the machinery, and the ore was passed from the stamps directly over the Frue vanner. The result was concentrates running 38 ounces silver, and 21 per cent. in lead, from iron ore that runs only 4 ounces in silver to the ton, and a trace of lead. With the addition of sizing and the further use of percussion tables, the result to be obtained is expected to be much more satisfactory. It is understood that during 1883 a large concentrating mill constructed on practical working principles will be erected.

The Little Chief adjoins the property of the Chrysolite Company. This mine was one of the richest on Fryer Hill, although the extent of ground is but small. The principal ore-bodies were exhausted two years since, but since that time occasional ones have been found which have more than paid working expenses. The company will, during 1883, prosecute extensive development work to ascertain if the mine possesses further resources in the direction of a second or lower contact. If this should prove to be the case the mine would again take its old place in the rank of producers.

The Little Pittsburgh Company owns the Little Pittsburgh, New Discovery, Minnemuc, Dives, and Union claims, all located on Fryer Hill, and east of the Little Chief. This mine at one time in its history was immensely productive, but sufficient attention was not paid to its proper development, and it was overworked. There remains, however, considerable ground which has not been prospected, and there are strong probabilities that the mine will again become of value. During the year the old ground was worked over and sufficient ore extracted to pay expenses; meanwhile exploration work is being actively pushed forward, and the territory of the company will be thoroughly prospected before any change in the present policy of working the mine takes place; the principal work is being done in the western portion of the New Discovery lode. Drifts are run from both Nos. 1 and 4 shafts, and winzes and raises made at all points extending the least encouragement.

The extraction of ore is confined altogether to the New Discovery lode, and some mineral of fair grade continues to be gleaned from these old workings.

The Little Pittsburgh claim with its workings has been leased to Messrs. Simpson & Blakey, who are working through numbers 2 and 3 shafts. Ten to twelve tons of iron ore are extracted daily by these lessees, who, by working economically and industriously, succeed in netting handsome profits.

Adjoining the Little Pittsburgh is the Amie, which has been consolidated with the Deer Lodge, and embraces about 15 acres. Much of the territory, however, extends to the north side of Fryer Hill, where but little ore of value has been found. The mine has produced and sold ore to the amount of over $700,000, and the present company has paid dividends amounting to $305,000. During the past year the company steadily continued exploration work, and although on the present levels the greater portion of the ore has been exhausted, occasional pockets of carbonates and iron ore are found which indicate the location of heavy and continuous bodies of mineral at some point in the vicinity where shafts, inclines, and levels have not yet reached. Several leases have been let on different portions of the mine, and the lessees of the No. 3 shaft made a development which once more brings the Amie among the productive mines. It has large resources of iron and low-grade ores, and if concentration proves successful the mine is yet good for large products and handsome dividends. An attempt has been made in this mine to demonstrate the theory that a second contact underlies the present workings, and a depth was attained of 482 feet, but the flow of water was too great to be controlled by the pump, and operations were temporarily suspended until heavier machinery could be procured.

The Climax is above the Amie and under the same management. It is worked by 5 shafts. No. 3 shaft, near the Amie line, is in the most productive ground, and from here to the Amie was one of the largest and most valuable ore-bodies ever discovered. On Fryer Hill, from No. 2 shaft, a number of drifts have been run and considerable ore extracted. The principal work of the year has been exploration, though a portion of the territory was operated under lease. One portion of the mine, known as the contract portion, has been worked through two shafts, but was not very productive. It was leased to parties to operate in consideration of sinking a shaft to mineral, and thus demonstrate the existence and value of the ore-body. Considerable ground remains unexplored and there are reasons to believe that new discoveries may yet be made.

The Dunbarton mine adjoins the Climax, and like the latter has almost exhausted the reserves on the present levels, and the company having divided $210,000 in dividends has dissolved. During the year the northern part of the workings were leased and only the southern portion operated by the company. There are large amounts of low-grade mineral in the mine which yield but small profit, and therefore but a limited amount of it is mined. If a second contact should be ascertained to exist within any reasonable depth, this mine would afford an opportunity to some one to reopen and profit by it. The south shaft is already about 360 feet in depth.

The Matchless, between the Dunkin and Robert E. Lee, continued an undiminished production during the year. At this point on Fryer Hill the contact is unusually thick and proportionately rich. The ore is for the most part chloride, crystalline particles of which are studded all through masses of ore, and sometimes specimens are obtained that assay many thousands of ounces. In the northern portion of the claim the ore is of medium grade, yielding but 30 to 40 ounces of silver to the ton, but vast amounts are found. In the south or Leonard shaft an exceedingly rich deposit was found near the line of the Robert E. Lee and Hibernia. The Matchless is the property of ex-Senator Tabor, who expended about $150,000 in purchasing the mine and securing conflicting interests, and although for a time it was unproductive, it has yielded largely and promises to do so for some time to come.

The Robert E. Lee mine continues to be the principal property on Fryer Hill, and developments are being continually made that add to its importance and value.

The history of the mine is one that has few parallels in the records of mining in the United States. One instance proving the richness of its ore, which mainly consists of chlorides of silver, may be stated. On January 14, 1880, ore was taken out to the value of $118,500 in the space of seventeen hours. During that month the production amounted to over $300,000. Since shipments first began, the value of the ore sold, has reached the total of $3,000,000. Of this sum perhaps two-thirds is net profit, the balance having been expended for mining and surface improvements, which have greatly enhanced the value of the property and afforded the requisite facilities for making it still more profitable in the future.

Great ore-bodies of exceeding richness are left standing in the already developed portions of the mine, and the present policy of the management of the mine is to push forward new development work and to open up new territory. The vigorous prosecution of work where the main ore-bodies exist having been retarded by water, an engine of 105 horse-power fitted with a Corliss bed, and gauged for a piston speed of 720 feet per minute, was put up. It is supplied with two boilers of 65 horse-power. It runs a Cornish pump with a capacity for 700 gallons per minute.

This company was the first to introduce sampling works of their own as an auxiliary to successful and economical mining. When the ores are thoroughly dried, they are conveyed by means of a tramway to the sampler; crushed, sampled, and assayed by the company's assayers before they are transported to the various smelting establishments in the near vicinity of Leadville.

In November, 1882, the company was reorganized and incorporated under the laws of Colorado, the name remaining unchanged.

The Little Silver adjoins the Robert E. Lee on the east. It has been worked under lease with reported success; the ore, averaging 80 ounces, was shipped to the La Plata smelter. The mine is showing up well, and promises to develop larger ore-bodies. Some months ago Little Silver was bonded to the owners of the Lee, and since then the two properties have been worked together. The north shaft of the Lee has been sunk 100 feet below the workings, and now by the aid of a large Cornish pump both mines are kept drained.

The Transatlantic, on the south side of Fryer Hill, the new location of the former Gambetta mine, has been leased. Work has been prosecuted vigorously. The shaft is 140 feet deep, and has exposed a large body of iron, which runs about 7 ounces in silver, 12 per cent. in lead, and 30 per cent. in iron. A number of drifts have been run, and a fine body of galena ore exposed, which now shows a vein nearly 3 feet in thickness. This ore runs from 27 to 30 ounces in silver and 69 per cent. in lead.

The Big Pittsburgh has been worked principally under lease. The lessees who worked through the Bates and Pearson shafts made small shipments of ore.

The Heytrosser and Lent shafts were also leased, and the company resumed work on the Heern shaft.

The Hibernia Consolidation consists of the Hibernia, May Queen, and Surprise claims, joining the Robert E. Lee, and on the south side of Fryer Hill. The property extends across Stray Horse Gulch into Yankee Hill, and joins the Denver City. After a season or two of prosperity the company became involved financially, and the mine has since been idle, except some little work done on portions of the property by lessees. An effort is being made to reorganize the company and recommence operations, as it is believed from the proximity of the mine to the Robert E. Lee and Matchless that the prospects for meeting large ore-bodies in the territory as yet unexplored are of a highly promising character.

The Forest City, east of the Hibernia and on Yankee Hill, continued taking out considerable high-grade ore. It is operated by the Small Hopes Company, in connection with the Robert Emmet. The slopes, about 100 feet to the southeast of the shaft, on the 175-foot level, are looking well.

The Denver City and Lee Basin mines, further to the east, have been developed and explored more thoroughly and to better advantage than heretofore.

The Denver City shaft and workings contiguous show an immense body of iron ore, frequently very rich in bromo-chlorides of silver, and the entire deposit will give a fair average. However, the ore is a siliceous iron and unsuitable for smelting purposes, consequently yields no profit if mined and sold to the lead smelters of this camp.

The Denver City shaft was enlarged, all the old timbering being taken out, the excavation enlarged and thoroughly secured by new timbering. When the shaft had reached a depth of 260 feet and a large amount of iron had been passed through, the management determined to experiment with a drill. This was done principally because the quantity of water was so great as to interfere with the sinking of the shaft. The drill soon proved ore of richness to exist below, and the work of sinking was again resumed. The pump from the Shamus O'Brien shaft was then removed to the Denver City shaft and sinking again commenced. It was soon found, however, that with machinery then in use it would be impossible to continue sinking. Therefore plans were made and soon executed to put up one of the finest plants of buildings and machinery ever brought to Colorado. The shaft-room is 40 by 40 feet in size, with two wings of 35 by 35 feet each, one for the timbering room and the other for an ore-house. There is also an engine and boiler room 35 by 40 feet in size. The engine is a double one, of 60 horse-power each, one engine to run the pump and the other to do the hoisting.

The Little Miami, near the Denver City and Lee Basin properties, was idle in the early part of the year, but work was resumed and an effort made to control the water, of which an excessive flow has greatly retarded operations. The mines of Yankee Hill have not as a whole been very successful, and afford but small hope of proving of future value.

On the north side of the hill are the Hawkeye, Holden, Dania, Last Chance, Aztec, and Kennebec, which pushed work to a greater or less extent on a promising contact, but nothing of especial value was demonstrated.

Carbonate Hill.—The mines of this locality have maintained their reputation as producers, and many valuable developments have been made, particularly on the northwestern slope of the hill.

The Catalpa is one of the best paying properties on Carbonate Hill. It adjoins the Evening Star on the south, and is located parallel with that and the Morning Star mines. It carries also the same valuable characteristics of lead which make those carbonate ores so desirable for treatment at the smelters. Nearly all the ore was taken from the old workings of the mine. Exploration work consists of 300 feet of incline driven under the contact and toward the eastern portion of the property. The extreme length of this incline from the main working shaft is about 500 feet. On the eastern portion of the property about 1,300 feet of levels have been driven, disclosing a reasonable amount of low-grade ore running from 18 to 25 ounces in silver per ton. On the western property a very large body of excellent mineral has been lately developed, and it promises to be very extensive in its proportions, and add very materially to the future product of the mine.

There is a large amount of low-grade iron, which yields a fair profit over the cost of mining and shipping. The body cut into near the shaft and drifted on for a distance of 80 feet toward the Evening Star line has already been shown to be 80 feet in thickness, with the full depth yet undetermined. It extends from the Catalpa into the Crescent, and it is estimated that there are fully half a million tons in sight. As it carries 60 per cent. in iron, and from 4 to 9 ounces in silver, it is very valuable for fluxing purposes, and promises to yield a handsome profit to both properties.

The upraise at the lower end of the incline, about 420 feet east of the upper shaft, has cut the streak of ore previously developed by an incline from the upper workings. It runs from 20 to 30 ounces in silver, and from 40 to 84 per cent. in lead.

The annual report of the Catalpa Mining Company for 1882 shows that the total receipts from silver, iron, and interest account were $95,450.23, and the expenditures $58,332.45, leaving $37,117.78 as the net profit. A dividend of $30,000 was paid, and the balance of $7,117.78 was added to the company's surplus, which now amounts to $62,279.23, or more than enough to pay two more dividends. During the year 5,202 tons and 415 pounds of silver ore, and 2,176 tons and 168 pounds of iron were mined.

The Evening Star is one of the most important properties of the district. It is located between the Catalpa and Morning Star. It has always been a large producer. In July of 1881 a vein was discovered which, when followed back westward to the shaft, proved continuous, varying from 1 to 5 feet in thickness. In following this vein it carried the drift, going west, up over the old workings. Going to the east the drift was run nearly on the line of the Catalpa mine, and now, at a depth of 40 feet below the first working levels, and to the east of them, the body is about 30 feet thick. The upper or western portion of the vein, which is above the old workings, was thoroughly explored and found to be continuous, and to have an average thickness of 2 feet of first-class ore, running 100 ounces of silver and 40 per cent. of lead. There was also a streak of second-class mineral lying immediately under this, and on top of the vein, having an average thickness of about 10 inches. The discovery of the large body of ore below and east of the old workings was a surprise. It was expected that only a 2 or 3 foot body would be found, instead of one measuring 20 feet. An expert who has recently examined the properties of which he writes, remarks as follows:

"The contact and mineral vein of the Evening and Morning Star mines has been opened from its outcrop eastward for 1,500 feet and over. The vein of the Lower Waterloo and Henriette mines has been explored for 600 or 700 feet, which carries the development 200 feet eastward, and beneath the outcrop of the upper vein. The possibilities of a fault are, therefore, entirely precluded, and nothing short of a complete fold in the limestone could re-establish the levels of the two veins and explode the otherwise irreconcilable evidence of two distinct veins, one situated several hundred feet below the other, and having a one-third greater pitch."

The Henriette is now sinking a shaft which, at 160 feet, passed through the first vein of ore, and still requires 150 feet additional depth to connect with the ore-body and incline from the Harker shaft, which develops the Lower Waterloo and Henriette ore-vein. Mr. Ward, of the Morning Star, will begin the sinking of a new shaft, which will pass through the first vein at about 140 feet, and is calculated to cut the vein opened by the Waterloo incline 200 feet east of the breast of the incline, and at a vertical depth of 400 feet below the surface. If the ore-vein opened in the Lower Waterloo workings is disclosed here in undiminished strength and grade, it will be a safe undertaking to sink the Upper Waterloo, Upper Henriette, and other shafts still farther to the east, to a depth of 1,000 to 1,200 feet, in search of the lower horizon of pay ore. The formation below the lower ore-vein is lime, and above it is a "bird's-eye or intrusive porphyry."

The very promising developments that have been made in the Waterloo claim of the Morning Star Consolidation indicate that the lower ore-body, which has now been followed into the hill in the Waterloo incline, will also be found underlying the present workings of the Evening Star. Manager Ward has therefore determined to sink the upper or main working shaft of the Evening Star for the purpose of catching this lower ore-body. As the ore from the upper workings is now hoisted through this shaft, and as the sinking of the shaft could not well be prosecuted if its present use is continued, it has been thought best to discontinue shipments from that portion of the mine for the present, and push the sinking of the shaft, which will be done as rapidly as three shifts can effect it. The shaft has already been sunk some distance below the upper ore-body, having a present depth of 300 feet, and it is estimated that a farther depth of about 100 feet will be required to reach the expected continuation of the lower ore-body developed further down the hill, both by the Waterloo incline and a shaft. The bottom of the shaft is now in iron and porphyry, and it is thought not unlikely that a layer of lime will also have to be passed through before the lower ore-body will be encountered. Operations in the lower workings will be continued, and as soon as the shaft reaches the depth to which it is to be sunk, shipments will be resumed from the upper workings, which still show large bodies of ore.

The Evening Star has declared 52 dividends of $25,000 each, and it now has to its credit a surplus of $75,000 in the treasury. The Evening Star Mining Company was organized on a capital of $500,000 in $10 shares.

The Morning Star is under the same management as the Evening Star. The descent into the mine by the old Lower Waterloo shaft encountered the first seam of ore at a depth of 70 feet. This shaft is located near the center of the western end lines of the company's properties. Levels are driven from here, both north and south. Following the level to the south, ore of excellent quality is disclosed for about 125 feet, and of variable thickness, averaging about 3 feet. By a system of inclined raises and parallel drifts this ore-body is blocked out over an area of 70 to 100 feet by 130 to 150 feet. On the lower or east side of the south drift the ore yet remains standing in a solid mass, unexplored and undeveloped.

From the foot of the Old Waterloo shaft a drift connects with the new shaft a short distance farther north. Around this shaft, known as the Waterloo shaft, numerous large stopes of ore are disclosed. From an area north and west of the shaft to the Henriett line on the north, fine faces of ore are exposed on every hand. From the bottom of the shaft a drift is driven to the eastward a short distance, where it again intersects the ore-vein shown west of the shaft and on the levels above. An incline is then driven to the eastward on the dip of the ore, which averages about 30°. This incline continues in ore on this dip. The development, so far as it goes, proves up a continuous body of ore. This ore-body is further developed by a series of cross-cuts to the south, connected by inclined raises running parallel with the inclines from the shaft.

Just north of the new Lower Waterloo shaft is the Harker shaft, which is similarly opened by an incline from the bottom of the shaft, with levels running at right angles every 50 feet.

Both in the Waterloo and Henriette mines these lower workings radiating from the breasts of the respective inclines, are at least 350 feet below the surface. The great depth of the ore here has led to the inference that another body must be located above, especially as several shafts directly over these workings show ore at a depth less than 100 feet. A new shaft has been commenced with a view to test the truth of this theory.

The main shaft following the old incline through the workings of the former owner reaches on the fifth level large blocks of heavy sand carbonates ready for stoping. From the fifth level north and east to the Maid of Erin and Big Chief lines, probably two-thirds of all the ore is standing in massive blocks of sand 6 to 12 feet in height, and averaging 60 to 70 per cent. in lead. At several points are minor streaks of ore, one 4 feet in thickness, and directly under the large blocks and stopes above. The amount of ore here in sight is very large, and it cannot soon be exhausted.

The output of the Morning Star is 70 tons of high-grade ore per day, averaging well in silver. It has paid fifteen dividends of $25,000 each, and now has a surplus of $50,000 in the treasury.

The Henriette mine, adjoining the Morning and Evening Stars, is one of the best opened and developed mines about Leadville, and one showing resources of ore in vast quantities. It has been worked with the view of opening up the unexplored territory east of the Harker shaft, large and valuable stopes of ore being laid open by a series of levels and cross-cuts run from the main incline, which is now in about 280 feet, running nearly parallel with the southwest side line about 60 feet distant. The eighth level courses about northeast to the northeast side line. This level is connected by cross-cuts to the parallel levels 9, 10, 11, 12, and 13, beyond which the main cross-cut is continued a distance of 120 feet to the breast. This is developed by a series of minor levels, running towards the northeast side line. All are connected with the main incline, tolerably well developing about twelve stopes of different dimensions. Every face and breast of the numerous drifts within the prescribed limits show mineral, which varies from 2 to 9 feet in thickness of carbonates and galena ore, with from 3 to 20 feet of iron of very variable grade in silver. The carbonate of lead ore carries from 8 to 25 ounces in silver, the galena from 25 to 400 ounces, the iron from 20 to 60 per cent. metallic iron, and from 5 to 30 ounces in silver. The carbonate, galena, and iron from a number of careful trials may be estimated to yield on an average about 20 per cent. of lead. Above the eighth level there is a very large body of low grade ore with occasional streaks of carbonate of lead, the whole mass paying for shipment with good prospects of opening up chutes of ore that are likely to prove very profitable. Towards the No. 3 shaft a very large block of mineral is opened up on two sides by what is called cross-cut No. 2. The thirteenth level and a portion of the main incline are now being driven through about 3½ feet of galena and carbonate ore, while the narrow workings of cross-cut No. 2 show a heavy sand carbonate running from 14 to 60 per cent. in lead, and low grade in silver. Beneath this there is but little doubt as to there being the usual galena ore which is rich in silver, averaging about 50 ounces. In a few places the richest ore narrows out to about one foot. The ore generally averages about 4½ or 5 feet in thickness, though from the appearance and measurements of the stopes between the eighth and tenth levels, from five to seven feet of mineral have been shipped, which, including low-grade iron ore from other parts of the workings, has netted from $16 to $20 per ton. The estimated ground lying between the eighth and tenth levels is only stoped to a moderate extent, some large blocks of good-paying ore yet standing, and much galena is shown up on nearly every face, which materially adds to the general value.

A peculiarity of this mine is the existence of two distinct, well-defined veins, the upper and lower, 150 feet apart, the interspace being filled in with porphyry. Most of the ore has been taken from the lower vein, which is penetrated both by the Harker and Central shafts. The new machinery introduced admits the working of the upper vein to advantage, and this has already been systematically begun. Beneath the lower vein exists a body of lime and porphyry, and the indications are unmistakable of the existence of still another body beneath the two mentioned when this intermediate mass is cut through. The upper or fourth shaft will be sunk with the view of reaching this third vein of ore. In September it passed under the control of English capitalists and was reorganized as "The Henriette Mining and Smelting Company, Limited."

The Big Chief, located above the Morning Star, is one of the properties that has come into prominence during the year. It has reached the contact and produced considerable quantities of valuable ore. It has been yielding about 20 tons of ore a day. The lower and eastern workings in this mine are looking well and show great promise. The great difficulty has been to control the water, the depth being so great that with present machinery it is impossible to drain the mine and to continue working. It is proposed to increase its capacity.

The Clontarf, adjoining the Big Chief, is developed by a shaft about 500 feet in depth, which is provided with heavy hoisting and pumping machinery. A fine ore-body has been developed by this shaft, but the amount of water to be handled has prevented the steady working of the mine. It has for some time been idle, but it is to be started, and it is thought, by working in conjunction with the Brookland and Big Chief, the water can be handled, and the mine be made to take its place among the producers.

The Brookland, north of the Big Chief and Clontarf, is the property of the Brookland Mining Company. In May, 1882, the mine was provided with a new plant of hoisting and pumping machinery, consisting of three 10-inch Cornish pumps, two plunger and ore-bucket lift or sinking pump. At that time the shaft was at a depth of about 485 feet, and has since been sunk to 540 feet. At this depth a body of fine carbonate ore, running 25 ounces in silver and 68 per cent. in lead, was struck and penetrated a distance of about 9 feet. The difficulty of handling the water compelled a change in the pumping machinery, which has been made, and will permit steady work to be continued.

The Agassiz is the property of the Agassiz Mining Company, of New York, and is situated on Carbonate Hill, above the Morning Star. The Wolfe Tone shaft encountered the ore-body, which is supposed to be continuous with that in the Morning and Evening Stars and in the Big Chief. At a depth of 633 feet water came in too rapidly to permit profitable working, and operations were suspended until a new and more powerful plant could be procured.

The Glass-Pendery is one of the most extensive and valuable mines of the hill. It consists of three claims, the Glass, the Pendery, and the Rough and Ready, and a large amount of development, consisting of three shafts and fully 5,000 feet of drifts, has been extended upon it. The work is laid out at regular right angles, and no effort is made to follow the ore-bodies, but occasionally raises are made or winzes sunk to find where the ore exists. Last spring, owing to some negotiations pending for the sale of the property, work was discontinued. The mine has produced several hundred thousand dollars, and has a large amount of ore developed. It is expected active work will soon be resumed.

East of the Big Chief is the Thespian mine, on the eastern slope of the hill. After a depth of 525 feet had been attained it was found impossible to continue sinking without heavier machinery, and a plant for pumping and hoisting was erected of sufficient capacity to enable the property to be thoroughly prospected. At the time work was suspended the shaft was still in porphyry, although a streak just encountered, which yielded assays of 70 ounces in silver and 49½ per cent. lead, apparently indicated that the contact was not far distant. The shaft is now at a depth of 580 feet, and is in contact matter, with good prospects. It is under the management of Captain Jenks.

The William Wallace, near the Thespian, is supplied with machinery, and is pushing the shaft, now over 550 feet in depth.

The Leadville Consolidated Mining Company's property consists of the Carbonate, Shamrock, and Little Giant, a very small portion of which has yet been opened. The mine has for some months past been gradually improving, and now shows resources and prospects of great value. It is looking better than at any time for the past two years, and many dividends are assured from the present developments. The territory of the company yet unexplored is very large, and, in fact, that worked is but a small fraction of the entire property. Development work has been kept far in advance of the mining. It is worked by three inclines, respectively called the Main, the South, and the Combination, the output being 10 tons per day of carbonates, yielding 40 to 135 ounces per ton. It has paid dividends within a little over a year of $100,000, nor has this been accomplished by exhausting its resources. On the contrary, the latter are constantly increasing in volume and value.

The Yankee Doodle is one of the oldest mines on Carbonate Hill. In its early history it was not regarded as very valuable, the ore being found only in pockets. A new shaft was subsequently started and extensive developments made. The shaft was sunk to a depth of 300 feet, and an incline has been run from a point lower down the hill to connect with the upper workings. This incline is about 600 feet in length, and is provided with suitable machinery. The mine is producing about 200 tons of ore of excellent grade monthly, and has been doing much better than ever before.

The Ætna adjoins the Yankee Doodle, and has been extensively developed, and has produced considerable ore. The main workings had, however, run out of ore, and the mine ceased to be productive, until last July, when the manager, Mr. J. R. Loker, sunk a new shaft at the extreme north end of the property, and caught a body of rich ore at the depth of about 25 feet. This ore-body was drifted on for some distance up the hill and also down the hill, where it rose to within 14 feet of the surface, and pitching down again, finally running perpendicularly. Ore running over 400 ounces in silver was produced from this ore-body, and developments are being prosecuted to follow it down by a shaft, as well as to drift to it from the old workings.

On *Iron Hill* the Iron Silver Mining Company own a group of the oldest and most productive mines in the district. It comprises the Iron Hat, Iron, Luella, Tucson, Stone, Rock, Dome, and Seventy-Six. The development of the company's property has been of the most substantial and extensive character.

The Iron property is worked through two inclines and the Rock and Stone through two inclines and a shaft. During the past year, while work was prosecuted on the eleventh level in the main incline, a large body of galena was disclosed in the lime formation. An air engine hoists this ore to the main level.

The Stone has recently developed into marked prominence as an ore producer. The vein matter in No. 3 shaft was encountered at a depth of 40 feet. A drift leading east shows ore in bulk and of various grades. Levels run from No. 2 shaft have developed an immense and continuous body of heavy lead carbonates, but a small portion of which has yet been extracted. Another shaft about 350 feet east of No. 2 is being sunk, which will permit the free drainage of the mine. A drift from No. 2 south connects with the workings on the south side of the creek, and has opened up a mass of contact matter 50 feet thick, containing some good ore. In the vicinity of No. 5 shaft vast bodies of iron alternating with solid blocks of ore are disclosed. Drifts extending in every direction show ore on all sides. An interesting feature in mine is evidence presented of a replacement of blue lime rock by mineral. Numerous instances have been found where in largest ore-bodies bunches of lime are encountered, showing disintegration from circumference, center still being solid lime. These bunches or bowlders show by their stratification and seams exact dip and strike of vein, corresponding precisely with limestone bedding, on which mineral is found. The characteristics of the ore produced are lead with an excellent percentage of silver. Many improvements have been made the past year in plant, machinery, and buildings, the most prominent of which is the introduction of hoisting engines, air-compressors, drills, &c., at a cost of $50,000. The company is engaged in sinking a new shaft about 700 feet east of the Stone workings. This shaft is expected to cut the vein at about 500 feet. The new shaft has three compartments, and will, when completed, be supplied with pumping and hoisting machinery that will be equal to any in this vicinity.

The Silver Cord mine, south of the Iron mine, includes the following claims, the Silver Wave, Cleora, Silver Cord, Delta, Willard, and other claims, giving it a territory of 55 acres. The old inclines and other workings, from which considerable ore was extracted in following the contact, have been practically abandoned, as well as the No. 1 incline, and the property is now chiefly worked through the newer No. 2 incline, which starts about the middle of the Silver Wave claim and passes through the Delta into the Silver Cord. The ore deposits, as far as known, consist of five vertical seams in the limestone, having a northeast trend. Their width ranges from 2 to 30 feet, and their depth has been developed 20 to 150 feet, the latter being the greatest depth reached in the limestone below the contact. Nearly twenty faces of ore are exposed to view, ranging from 2 to 20 feet in width, and in one place 60 feet in height. The ore in all instances is a fine gray hard carbonate, except in the "gold stoke" where the mineral is mixed with a sand carbonate and ochre, giving the product from this section of the mine an average value of three-fourths of an ounce in gold to the ton, in addition to a good average in silver and lead. As yet the mine has been explored for a distance of only 725 feet from the outcrop, while it extends to the eastward nearly half a mile. The Silver Cord combination is producing from 4,000 to 4,500 tons of ore per month, averaging about $20 per ton above the cost of treatment. Four hundred men are employed by the company, and the monthly expense accounts are in the neighborhood of $45,000.

South of the Silver Cord is the Smuggler Consolidated, consisting of the Smuggler and Star of Hope claims. The mine is leased and the company receives 30 per cent. of the gross output of the mine, which yields a handsome profit and has already enabled the company to pay several dividends. Before any lease was made, and while the company itself was working the mine, no profit was realized. The mines comprising the property of the Smuggler Consolidation are well known as among the most prominent of Iron Hill. They maintain a very regular output of 30 tons a day. The workings in the neighborhood of the north, or Clark shaft, are proving up particularly well. The ore from this part of the mine averages 40 ounces in silver to the ton and carries about 50 per cent. lead·

The A. Y. mine was an excellent producer during the greater part of the year, but the extraction of ore was almost entirely discontinued during the latter months to enable necessary repairs and alterations in the underground workings. The product of the mine generally runs well in lead, and the percentage of iron as a rule is in excess of the silica, making it a most desirable smelting ore. Value in silver varies somewhat; but is generally low. Average net value of ore is about $10 per ton above smelting charges. During past year mine has averaged a product of not less than 60 tons a day. Several immense stopes have been made, and several times mine looked weak, but on each occasion disclosed new resources superior to those exhausted. Sulphuret ores disclosed in the shaft and contiguous to same have almost disappeared, and have cut out little, if any, of the oxidized and carbonate ores, which have been source of profits of the A. Y. mine. Ores showing crystals of cerusite have nearly disappeared, although mineral carries as good an average in lead as heretofore. Extension of the underground workings of the mine is being pushed out into new and undeveloped territory, and it has been decided to sink a new shaft to facilitate operations, for which the preliminary work of grading is in progress. The new shaft is to be located a few hundred feet northeast of the present working shaft of this property.

The Ruby adjoins the Iron Silver and Silver Cord mines on the east, and is located on the same vein, which at the point of location of the Ruby shaft is nearly 500 feet from the surface. It is an old location, but owing to the depth necessary to reach the contact—nearly 600 feet—and the difficulty experienced in handling a large flow of water, much time was consumed in reaching pay ore. Late in the year the mine developed surprising resources of ore, low in silver but high in lead of very desirable smelting quality. The shipments amount to 45 tons per day, and the indications are that this mine will become one of the best and most permanent producers.

The Colonel Sellers, adjoining the A. Y. mine on the east, has been actively prospected. During the fall months a large body of ore was encountered at a depth of 275 feet, and the strike was also accompanied by volumes of water. Large and strong hoisting and pumping machinery is now being placed in the mine.

The La Plata mine is owned by the La Plata Mining and Smelting Company. The work of the past year has shown great additional resources, and, like most Leadville mines on this ore belt, the more that is extracted the more seems to be in sight. The La Plata at present shows a number of fine stopes, with large breasts of ore, from which it is no trouble to extract the output which this mine has made.

Adjoining the La Plata and Stone mines is the Gilt Edge property, on which prospect work has been uninterruptedly prosecuted for two years past. The mine has disclosed considerable sulphuret ore, similar to the iron pyrites and low-grade ores found in the A. Y. mine. It is being worked by the Elgin Mining Company, with every indication of success. The hoisting works have been removed to the discovery shaft, which has been sunk to a greater depth, and disclosed some very fine ore. Machinery is on the ground, and preparations are being made for sinking a new shaft in the bed of the gulch.

The Argentine group comprises the Camp Bird, Charleston, Gallagher, and other locations situated on north side of Iron Hill. The dip of formation is nearly eastward, being with slope of hill. During past year an ore chute has been followed westward through Charleston and Camp Bird lodes, and stopes run for many hundreds of feet within a few feet of surface. In greater portion of developments in mine the limestone seems to have been entirely replaced by mineral, and frequently replacement has even taken hold in lower quartzite, resulting in siliceous ore, usually running much higher in gold and decreasing proportionately in lead.

Developments in this group of mines show very plainly some of the faultings in the district. The Develin shaft, which is situated right on the line less than 50 feet west of outcrop in the Charleston, was sunk 240 feet, when the fault was encountered, dipping to the westward at about 45°. An incline shaft was then continued another 180 feet, following down on crevice of fault, but without reaching contact of porphyry and lime to westward, showing a displacement of the contact of over 400 feet vertically. Fault can be traced running nearly south, leaving the Belle of Colorado shaft to westward, and still in block porphyry. The Hines shaft is just about on a line of this fault, and by a short drift disclosed the fault, and an incline was driven on the same a short distance. South of the more productive workings of Camp Bird lode dolomitic limestone was again encountered, which presented an immense roll, and seems to have escaped all influences which might have replaced it with mineral. No traces of ore could be found in this mass of lime, though it has been prospected both on the upper and lower contacts—the contact with porphyry and the contact with the quartzite—also through the lime. The company now have under advisement the more thorough exploration of the territory lying west of the fault exposed in the Develin shaft, and known as the Keystone lode. There is every probability that this piece of ground at a great depth will show an extension of the Camp Bird and Charleston ore chutes, which by the fault have been depressed 500 to 600 feet. These mines have done extremely well, and shipped considerable high-grade ore running 200 ounces of silver to the ton and 50 to 60 per cent. in lead. The ore was taken mostly from the Camp Bird.

The Adelaide mine has lately developed large bodies of fair ore in the eastern portion of the lode in a chute having a trend into the hill. The prospects are that the mine will do better than ever before. It is the property of the Terrible Mining Company.

On *Breece Hill* the Highland Chief, near the summit, is the principal mine. It is the property of the Highland Chief Consolidated Mining Company, and comprises 33½ acres, less than one-fourth acre of which has been explored around the Highland Chief shaft. A tunnel 225 feet long and 120 feet below the summit connects the present workings with a spacious ore-house, office, &c., and at the surface above is a fine shaft-house with a first-class 40-horse boiler, engine, and hoister. Although pockets of high-grade ores have been struck from time to time in the mine, and a large production has been realized, the great bulk of the ore found is low grade. A lease was made last summer, and the lessees put up concentration works, by which process they have since been able to work the mine profitably. Should concentration works of sufficient capacity be put up, a large output of ore and handsome profits can be made from this mine. Considering the immense ore-bodies discovered in its limited development, it is justly regarded as one of the most promising in the camp.

The Eliza mine, below the Highland Chief, has been worked for some months past and with very good results. The discoveries recently made in this and neighboring properties have done much to restore confidence in Breece Hill.

The Mike and Starr Claims are located on the west slope of Breece Hill, and are separated from Iron Hill and its mines by the Mike fault, which produces quite a gulch between the two hills, and displaces the contact horizon to a considerable extent. The ore consists principally of iron and copper pyrites, with some galena, carrying silver in the form of black sulphurets, and is quite refractory. When first encountered it was of low grade, but has grown richer, and averages 109 ounces of silver. It has also a considerable value in lead and copper, there being a streak of ore about 2 feet in thickness that averages 10 per cent. of the latter, mostly in the form of green carbonate and red oxide. The more recent developments consist of a shaft 480 feet deep, from which about 800 feet of drifting has been done, principally towards the east. The depth of the shaft and the water coming in freely rendered work impossible with the limited machinery. Consequently the mine was shut down for a time and a new plant of machinery purchased. This has been put in place and work resumed. With the new machinery some large shipments of ore can be expected.

The Antioch mine, at the head of White's Gulch, on the southern slope of Breece Hill, is on a gold-bearing lode. A number of shafts were sunk on the property, and ore carrying considerable gold was discovered in the shaft at a depth of 3 feet from the surface, and again in drifts run from the shafts at a depth of 30, 60, and 80 feet. The shaft was then continued down to a depth of 120 feet, and drifts were run with the expectation of catching the vein on its dip below. The ore-body then developed showed an average thickness of 32 feet, yielding by mill run from $10 to $32 in gold. A tunnel was also driven in on the lower end of the claim for a distance of about 200 feet, cutting the same ore-body previously developed in the shaft, assaying from $12 to $26 in gold. The mine is provided with ample hoisting machinery, shaft-house, and ore-bins, and a 10-stamp mill has been erected.

On the Breece Iron mine but little work was done, the demand for its ore having declined, owing to the number of other mines furnishing an equally good quality for fluxing purposes.

The Galesburg is one of the mines of Breece Hill which has come into prominence during the year. Up to the beginning of the past year, though a fine contact had been struck and a few patches of ore mined, the property could not be called productive. Within a few months past, however, a large body of good-grade ore has been uncovered and the mine has been regularly shipping.

The Consolidated Yankee and Breece Hill property consists of the Loveland, Superior, Keystone, Dubuque, Caledonia, California Gulch, Theresa, and Mountain Boy. All these are contiguous, forming a solid block of mineral district. All have been more or less worked uninterruptedly since they were purchased and the company organized, but some of them show a greater amount of development than others. On the Keystone a fine shaft-house has been built, sheds for fuel and timber erected, and a dwelling-house put up. The principal shaft is 285 feet deep. In this claim the lessees have been following a distinct vein of mineral, which has steadily enlarged to a good-sized body of low-grade ore, and assays show that the quality of the mineral is every day improving. On all the claims work has been done, and on three of them good contacts disclosed. The Mera shaft is 340 feet deep. The Superior shaft has attained a 300-foot depth. Mineral similar to that struck in other contact deposits has been found, but owing solely to a deficiency in lead it does not pay to ship. The Loveland shaft cut through three feet of loose material carries both silver and gold, but not in paying quantities.

Across South Evans Gulch from Breece Hill is the Little Ellen mine, on Little Ellen Hill. It is the property of the American Mining and Smelting Company, which has not pushed work upon it as vigorously as could be done on account of the amount of ore on hand at the smelter, purchased from other mines and shipped from their own properties. The Little Ellen ore is excellent for smelting, containing a high percentage in lead. Though low grade in silver it carries some gold, and the three metals, gold, silver, and lead, render it of very fair grade.

The Izzard, above the Little Ellen, has been supplied with a heavy plant of machinery, and has been a regular producer of ore.

The Virginius, on the north side of the hill, is owned by the United States Gold and Silver Mining Company. It has maintained a steady output of ore, principally galena and carbonate, averaging from $16 to $20 per ton.

The Tenderfoot is on the western extremity of the hill, and developments have opened a 3-foot body of siliceous carbonates, running from $28 to $30 in silver, lead, and gold.

The Opulent mine is credited with disclosing an extensive body of low-grade carbonate ore. It is being worked by Lowrie & Co., and is making regular shipments of 8 to 12 tons a day.

On *Printer Boy Hill* the First National, in Iowa Gulch, has shown a decided improvement both in quality and quantity of ore, but owing to the amount of water operations were temporarily suspended. A shaft was sunk about 160 feet, cutting through a large body of low-grade galena. At this depth lime was encountered, and a drift was run to the northeast on top of the lime, cutting several small seams of good pay mineral, but not in sufficient quantities to work. It being evident from the dip of the vein that they would have to go deeper in order to find pay mineral, it was decided to sink through this wedge of lime and then drift north into the hill to again cut the vein of ore. A great deal of work was done during the year. The mine shows almost endless quantities of sulphide and blende ores carrying native, brittle, and sulphuret of silver. A concentrating mill has been completed and will be started up early in 1883.

The Brian Boru, Nettie S., and Cliosophis, on Printer Boy Hill, have been leased, and are producing some rich ore. The Brian Boru, particularly, is yielding high-grade lead and silver ores.

The Nisi Prius extends from Iowa Gulch into Printer Boy Hill. The tunnel is some 700 feet in length. Occasional pockets of good ore have been discovered, and prospecting work is still being vigorously prosecuted.

On the opposite side of the gulch, on *Long and Derry Hill*, is the Long and Derry mine, which was among the first to make shipments of ore from the vicinity of where Leadville now stands. It is now being worked, and is shipping a fair amount of ore. Its production for 1883 will far exceed that of previous years. The ore is found chiefly in the limestone and not between it and a porphyry cap-rock, although the latter rock is found in the immediate vicinity of the property.

In the Preston the ore is a galena and carbonate, and assays from 79 ounces silver and 24 per cent. lead to 513 ounces silver and 53 per cent. lead. The mine is provided with ample hoisting and pumping machinery.

During the year considerable attention was attracted to Sugar Loaf Mountain, one of the foot-hills of Mount Massive, and at the head of Frying Pan Gulch, about 2½ miles back of the Soda Springs. In Frying Pan Gulch the Shields, Venture, and Welsh mines have become known as producers, but it was not until last fall that the discoveries were made that have attracted so much attention to Sugar Loaf Mountain.

The developments in the Shields mine, in Frying Pan Gulch, were considered sufficient to warrant the erection of a 10-stamp mill, which, under the management of Maj. A. V. Bohn, has been operated successfully on ore from the Shields, Venture, Welch, and other mines that have been opened up in that neighborhood.

Among the most important of the discoveries that have been made on Sugar Loaf Mountain, and the one in which the richest ore has been found, is the Birdie R. A shaft has been sunk on the vein to a depth of 100 feet, carrying the ore with it all the way. At a depth of 44 feet drifts were run up and down the vein, being now in about 15 feet. The vein is 6 feet between walls, and shows from 10 to 15 inches of sulphide ore on the hanging wall, running about 150 ounces in silver and as high as 211 ounces in silver, 2½ ounces in gold, and 18 per cent. lead. Below this sulphide ore, and extending to the foot wall, are some 4 feet of quartz, through the middle of which runs a streak exceptionally rich in native silver, while the whole body runs well in silver. Shipments were begun from this mine at a depth of 13 feet, the ore going to the Shields mill, and running from 68 to 109 ounces in silver. The vein, has been traced for 1,500 feet, the full length of the claim, and is located on both extensions, both of which show ore, and is considered one of the truest and best mines on the mountain, and has thus far been the best producer. Two shifts are now being worked in sinking the shaft and running the drifts, and two more drifts will soon be started from the 100-foot level, thus affording a large amount of stoping ground. In connection with the Birdie R. are several other claims, all of which show well-defined veins, with from 2 to 3 feet of ore. The property promises to become one of the most valuable in the district.

The Orinoco, Dinero, Gunnison, Juliet, Whittlesey, and Sawyer are promising discoveries. The most prominent of these is the Dinero. This property was bonded by Mr. Langhorn and others, and, under skillful management, has disclosed a strong and rich vein of ore. The mine is a true fissure of 10 to 15 feet in width, located in granite formation.

Adjoining the Dinero is the Gunnison, owned by Maj. W. B. Royland. It is a property equal to its neighbor, and partakes of the same character generally. Both mines are supplied with hoisting machinery and other necessary equipments, and are now among the regular producers of the district.

Mr. William A. Bray, of Leadville, to whom I am indebted for much of the foregoing information, writes that the producing mines of Leadville at present number sixty to seventy-five distinct properties, employing from 5 to 400 men, according to the magnitude of the ore-bodies and the output of the mineral. About half of these properties are owned and worked by incorporated mining companies, while the remainder are either private properties, or else are being worked on tribute and lease. The following are the chief producing mines of the county:

Name of mine.	Name of manager.	Daily output.	Number of men employed.
FRYER HILL.			
		Tons.	
Annie	Leased	30	50
Climax	do	3	6
Dunkin	do	10	20
Little Pittsburgh	E. C. Gillman	28	40
Matchless	Lou. C Leonard	50	65
Robert E. Lee	A. B. Wood	75	200
Chrysolite	R. N. Clark	20	75
Little Silver	—— Kearney	10	30
YANKEE HILL.			
Forest City	J. T. Elkins	10	8
Lee Basin	Robert Bunson	5	25
Denver City	do		8
Vanderbilt	Leased	12	15
Magnolia	do	10	15
Big Pittsburgh	do	10	20
Robert Emmet	do	10	20
Double Decker	do	2	8
Yankee and Breece Hill	do	2	8
CARBONATE HILL.			
Evening Star	W. S. Ward	30	30
Morning Star	do	75	162
Catalpa	Charles L. Hill	30	48
Crescent	do	3	10
Lower Catalpa	Leased	8	24
Leadville Consolidated	O. H. Harker	12	30
Henriette	do	70	90
Carbonate Hill	George Summers	8	30
Agassiz	Leased	6	15
Ætna	J. R. Locker	8	15
Seneca	Leased	4	7
Surprise		8	12

Name of mine.	Name of manager.	Daily output.	Number of men employed.
IRON HILL.			
		Tons.	
Iron Mines	W. Ahrens	275	475
Silver Cord	T. S. Wood	165	400
A. Y	Samnel Harsh	30	55
Ruby	Dave Williams	45	60
Argentine	Franz Fohr	12	26
Belgian	Leased	2	12
Adelaide	Walter Chureh	18	45
Smuggler Consolidated	Leased	20	35
Iron Hill Consolidated	J. F. Campion	10	26
Col. Sellers	Charles Stebbins	2	12
La Plata	M. E. Smith	70	65
Emmet		......	20
Gilt Edge	Leased	10	20
Vining	J. L. Loomis	5	12
Syrian	Leased	3	7
Crown Point	....do	3	6
O'Sullivan	M. Sullivan	2	7
BREECE HILL.			
Rebel Minnie	J. B. Hensler	2	9
Mike & Starr	Manrice Starre	6	24
Breece Iron	S. M. Slater	15	20
Printer's Girl	Fred Baudry	1	10
Jay Bird	Daniel Crook	......	6
Highland Chief	Leased	18	30
Eliza	....do	4	8
Park mine	....do	2	7
Miner Boy	....do	2	5
Little Prince	....do	......	8
Calesburg	....do	......	12
LITTLE ELLEN HILL.			
Little Ellen	Fred. H. Ketchum	40	65
Izzard		5	12
Opulent	Leased	18	24
Virginius	....do	16	20
Tenderfoot	....do	8	15
New Year	H. Well	......	7
PRINTER BOY HILL.			
Lincoln	S. Gloris	3	5
Florence	Maurice Starne	1	4
First National	W. Trimble	......	9
LONG AND DERRY HILL.			
Long & Derry	J. C. Langhorne	3	20
Center & Belcher	J. L. Loomis	4	15
Eagle Consolidated	W. Tremble	......	12
Mount Sheridan mines		6	24
Dyer Mount mines		3	12
SUGAR LOAF MOUNTAIN.			
Dinero	J. C. Langhorne	6	25
Gunnison	W. B. Rogland	4	20
Shields	Neils Larson	8	30
Venture	C. Taylor	1	2
Soper	R. H. Buck	1	4
Welsh		1	2
Hancock	Leased	2	8
Oronoco	....do	1	7

On account of the large production of ores from Lake County, and from their character, the business of smelting at Leadville has assumed large proportions, and although during the past year extensive additions were made to their capacity, they were found insufficient, and large amounts of ore are awaiting future treatment.

The Leadville Herald furnishes the following *résumé* of the various smelting works in the vicinity of Leadville:

"THE GRANT SMELTING COMPANY.

"The works of the Grant Smelting Company were originally started in 1878 by J. & J. B. Grant. Two furnaces were built that year, and several additions made the following year. In January, 1880, the present firm was formed, which consists of J. B. Grant, Edward Eddy, and W. H. James. A number of very important changes were made, including the construction of new furnaces and the introduction of large new engines. Everything was running along smoothly and 225 tons of ore per day were being treated until the night of the 24th of last May, when the works were enveloped in flames, and notwithstanding the earnest efforts of firemen and citizens nothing but the smoke-stacks were left by the unrelenting fire fiend. Up to the time of this disaster the shipments of silver and lead for the year aggregated $1,338,913. For some time it was not known whether the firm would rebuild or remove to another point, and during this interval the

"ELGIN SMELTER,

which had been idle during the early part of the year, was leased by the Grant Smelting Company, and was soon busy in the reduction of ores. From July until the furnaces were blown out on the 28th day of December the two stacks were kept constantly going. During the past three months the products were 1,948,800 pounds of bullion, which contained 1,940,150 pounds of lead, valued at $93,127, and 130,406 ounces of silver, worth $144,750, making a total value for the quarter of $237,877.

"LA PLATA MINING AND SMELTING COMPANY.

"The first of the large buildings of the La Plata Mining and Smelting Company was built in June, 1878, by Berdell & Witherell, who were then engaged in the business of sampling and crushing ores. A furnace of 30 tons capacity was started in October, 1878, and the second one built in February, 1879. On June 14, 1879, the new company purchased the entire property and took possession of the smelting works, together with 24 acres of ground and about twenty buildings located just below the city of Leadville. At the same time the three claims on California Gulch, known as the La Plata mines, were transferred. The new company constructed a third furnace, which was put in operation on August 1, and the fourth was started on the 22d of December, 1879. During the year 1879 the value of the bullion produced at the works amounted to $1,741,600. In the year of 1880 the production was $2,316,410.

"Two new furnaces were built during the year 1881, one started in April, and the sixth put in blast on the 13th of December. All the six furnaces are now running and reducing about 160 tons daily. Several large additions to the buildings have also been made, and a large roaster has been placed in service during the past year. The yield for the last quarter was 3,649,746 pounds of bullion, containing 333,888 ounces of silver and 3,626,877 pounds of lead. The silver valuation is $370,615, and the lead is worth $174,090, making a total for the last three months of $544,705.

"AMERICAN SMELTER.

"This is one of the most successful smelting companies in California Gulch, and in addition to the treating of ores from the mines of Leadville owned by outside parties, the company handles the output of several mines which belong to them. There are four large and one small furnace, all of which are kept constantly running. The products of the last quarter are 1,341,500 pounds of bullion, containing 1,334,000 pounds of lead, worth $64,032; 104,590 ounces of silver, worth $116,095; and 1,513 ounces of gold, worth $30,260, making a total production of $210,387.

"ARKANSAS VALLEY SMELTER.

"At the western end of California Gulch stands the Arkansas Valley smelter, formerly known as the Utah or Billing & Eilers, and they are recognized among the most complete and successful works about Leadville. In the latter part of 1881 Mr. Gustave Billing purchased the entire property, and conducted them as sole owner until the beginning of 1882, when the A. R. Meyer & Co. Sampling Works incorporated with Billing & Eilers, and formed the Arkansas Valley Smelting Company. The result of this combination is the transaction of one of the largest businesses in the camp. During the last quarter alone the yield was 3,252,069 pounds of bullion, of which 244,664 ounces were silver and 322¼ ounces gold. The value of these products are: Silver, $271,577; lead, $155,294; and gold, $6,445; making a total of $433,316.

"HARRISON REDUCTION WORKS.

"The Harrison Reduction Works, which were the pioneer smelting works of Leadville, were entirely rebuilt during the year. Two years ago there were two small furnaces, which were closed down in January. The company then commenced remodeling the entire works. Large sampling works were built, new engines were added, and four new furnaces put up. Two of these new furnaces were put in blast on the 7th of September, 1881, and have since been kept in blast. During the past year the works have been further improved and enlarged, and are now among the most conveniently arranged smelters in the camp. This labor of progression has not yet been completed, for the management has in contemplation the erection of a 100-ton furnace. The shipments for the past three months were as follows: 316,555 ounces of silver, worth $351,376; 5,392,179 pounds of lead, worth $258,825; and 1,237.6 ounces of gold, worth $24,752; making a total value of $634,953.

"EDDY, JAMES & CO.

"The firm of Eddy, James & Co. is comprised of the same members as the Grant Smelting Company, namely, Edward Eddy, W. H. James, and J. B. Grant. The firm does an immense business in buying ores and bullion. In computing the shipments for the year only such ore as is bought and shipped away from Leadville for treatment is computed. The other ores purchased by them, as well as the bullion, are computed in the smelter's statement. In addition to supplying the Elgin Works, the firm has sent large quantities to the Grant Smelting Works at Denver and also to the works at Pueblo. For the past three months Eddy, James & Co. shipped 36,953 tons 600 pounds of ore, valued at $1,885,134.

"AUGUST R. MEYER & CO.

"This firm formerly conducted a business similar to Eddy, James & Co , but in March last, in consequence of the incorporation of the Arkansas Valley Smelting Company, attention has been confined principally to smelting. During the first quarter of 1882 $118,681 were thus shipped, but since then no returns of shipments have been made. The sampling works are now used for the private accommodation of the smelting company.

"CUMMINGS & FINN.

"The works of Cummings & Finn have had large additions during the past year, and are now among the largest and most successful works about Leadville. There are six large furnaces, all in successful operation. New dust chambers have been introduced, and are giving the firm the best of satisfaction. During the past three months 41,000 bars of bullion have been turned out, weighing 4,141,000 pounds, containing 351,984 ounces of silver, 4,116,848 pounds of lead, and 650 ounces of gold. The value of the silver is $390,703; gold, $13,000; and lead, $197,609; making a total of $601,312.

"LEADVILLE GOLD AND SILVER MILL COMPANY.

"The amalgamating works of Taylor & Brunton are now known as the Leadville Gold and Silver Mill Company, with Mr. H. S. Kearney as manager. Neither of the old firm is any longer interested. The works are largely automatic and contain a number of improvements in the machinery, which have been devised by Mr. Kearney. The result of the labors of the past three months has been the turning out of fifty-six bars of silver, with an aggregate weight of 75,676 ounces and a total valuation of $84,000.

"TABOR MILLING COMPANY.

"During the past year the Tabor Milling Company has been enlarged by the addition of a new large stamp mill. The bullion shipments for the past year amounted to $280,616, of which amount $74,445, or fifty bars, weighing 67,078 ounces of silver, were made in the last three months.

"SHIELDS'S MILL.

"The production from the Shields mill, located in Colorado Gulch, at the mouth of Frying Pan, for the past three months has amounted to twenty-six bars, weighing 21,622 ounces of silver, with an aggregate value of $24,000.

"ORO MILL.

"The old Oro mill has not been worked steadily during the past year, but at intervals during the last three months the machinery has been in motion. The result for the quarter was the obtaining of 200 ounces of gold, valued at $4,000.

"GULCH MINES.

"This formerly popular industry of California Gulch has almost been forsaken in this vicinity, although it is carried on in the summer time more or less in all the surrounding gulches. The products for the past year were rather more remunerative than during 1881, and the total result is estimated at $63,500."

The tables appended below will still further furnish useful and reliable information.

The following are the values of the shipments of the various works for the four quarters of the year 1882:

QUARTER ENDING MARCH 31.

Harrison Reduction Works	$434,718
August R. Meyer & Co	118,681
La Plata Mining and Smelting Company	715,895
Tabor Milling Company	64,062
Arkansas Valley Smelting Company	619,524
American Mining and Smelting Company	368,941
Cummings & Finn	403,107
Leadville Gold and Silver Milling Company	117,000
Shields Mining and Milling Company	18,000
R. E. Lee mine	40,000
Grant's Smelting Works	826,610
Eddy, James & Co	322,080
Total	4,048,618

QUARTER ENDING JUNE 30.

Harrison Reduction Works	$397,495
La Plata Mining and Smelting Company	478,212
Tabor Milling Company	85,052
Arkansas Valley Smelting Company	795,541
American Mining and Smelting Company	204,179
Cummings & Finn	458,710
Leadville Gold and Silver Milling Company	150,525
Shields Mining and Milling Company	15,005
R. E. Lee mine	252,550
Grant's Smelting Works	512,303
Eddy, James & Co	414,200
Placers and other sources	10,000
Total	3,773,772

QUARTER ENDING SEPTEMBER 30.

Harrison Reduction Works	$477,217
La Plata Mining and Smelting Company	641,677
Tabor Milling Company	57,057
Arkansas Valley Smelting Company	627,985
American Mining and Smelting Company	315,407
Cummings & Finn	609,879
Leadville Gold and Silver Milling Company	100,184
Shields Mining and Milling Company	23,000
R. E. Lee mine	75,793
Eddy, James & Co	1,245,818
Mike and Starr mine	4,500
Placers and other sources	53,500
Grant Smelting Company (Elgin)	343,317
Total	4,575,334

QUARTER ENDING DECEMBER 31.

Harrison Reduction Works	$634,953
La Plata Mining and Smelting Company	544,705
Tabor Milling Company	74,445
Arkansas Valley Smelting Company	433,316
American Mining and Smelting Company	210,387
Cummings & Finn	601,312

Leadville Gold and Silver Milling Company	$84,000
Shields Mining and Milling Company	24,000
Eddy, James & Co	1,885,134
Grant Smelting Company (Elgin)	237,877
Oro Mill	4,000
Total	4,734,129

THE YEAR'S SUMMARY.

Harrison Reduction Works	$1,944,383
August R. Meyer & Co	118,681
La Plata Mining and Smelting Company	2,380,489
Tabor Milling Company	280,616
Arkansas Valley Smelting Company	2,476,366
American Mining and Smelting Company	1,098,914
Cummings & Finn	2,073,008
Leadville Gold and Silver Milling Company	451,709
Shields Mining and Milling Company	80,005
Robert E. Lee mine	368,343
Grant Smelting Works	1,338,913
Eddy, James & Co	3,867,232
Grant Smelting Company (Elgin)	581,194
Mike and Starr mine	4,500
Oro Mill	4,000
Placers and other sources	63,500
Total	17,131,853

1881'S SUMMARY.

The Grant Smelting Company	$3,077,014
La Plata Mining and Smelting Company	1,960,531
American Mining and Smelting Company	966,675
Utah Smelter, G. Billing	2,473,900
Harrison Reduction Works	337,744
Eddy, James & Co	878,248
August R. Meyer & Co	137,796
Cummings & Finn	1,964,061
Taylor & Brunton	401,668
Tabor Milling Company	152,437
Shields Mill	42,500
Colorado Prince Mill	66,000
California Smelter	478,250
Oro Stamp Mill	4,000
Ohio and Missouri	160,692
Gulch mines	69,000
Total	13,170,576

The figures above given represent a much larger proportionate tonnage than in previous years, in consequence of the increased facilities for handling low-grade ores. The basis on which the calculations are made also tend to increase the tonnage, as instead of allowing the old-time figures for silver and lead the values have been fixed at $1.11 for silver and 4.8 cents for lead, while gold is rated at $20 per ounce.

PRODUCTS OF PREVIOUS YEARS—LAKE COUNTY.

1860-1874. Gold from placers	$6,400,000
1874. Gold and silver	145,000
1875. Gold and silver	113,000
1876. Gold, silver, and lead	85,000
1877. Gold, silver, and lead	555,330
1878. Gold, silver, and lead	3,152,925
Total	10,451,255

PRODUCTS OF LEADVILLE.

1879. Gold, silver, and lead	$10,333,740 69
1880. Gold, silver, and lead	14,187,697 00
1881. Gold, silver, and lead	13,170,576 00
1882. Gold, silver, and lead	17,131,853 00
Total Leadville productions	54,823,866 69
Total Lake County	10,451,255 00
Total product 1860 to 1883	65,275,121 69

DIVIDENDS DECLARED.

Name of company.	During 1882.	Total to date.	Surplus on hand.
Smuggler	$18,900	$25,000	$5,000
Iron Silver	400,000	2,000,000	150,000
Robert E. Lee mine	500,000	2,000,000	250,000
Evening Star	700,000	1,325,000	80,000
Morning Star	300,000	1,050,000	50,000
La Plata Mining and Smelting Company	255,000	670,000	150,000
Henriett Mining and Smelting Company	30,000	100,000	50,000
Catalpa Mining Company	30,000	210,000	50,000
Leadville Consolidated	80,000	290,000	20,000
Chrysolite		3,350,000	230,000
Matchless mine	250,000	1,800,000	

The production, according to the Democrat, was as follows:

Period.	Value of lead.	Value of silver.	Value of gold.	Value of ore shipped.	Total value.
First quarter	$4,169,037	$2,328,248	$61,120	$485,762	$4,044,167
Second quarter	1,020,779	2,093,301	49,720	599,059	3,773,772
Third quarter	1,130,251	1,988,142	130,950	1,326,111	4,575,334
Fourth quarter	942,977	1,827,561	78,457	1,885,134	4,734,129
Total for year	4,263,044	8,237,252	320,257	4,296,066	17,127,402

As we understand it, these are the cash values realized—not assay values—and it is noteworthy that the aggregate figures are greater than those of last year by nearly $4,000,000, while nearly $2,000,000 in excess of the largest product, that of 1880. This speaks volumes for the permanency of Leadville as a mining and metallurgical center.

We also append the following interesting statement of the value of the product of Lake County for the twenty-three years ending December 31, 1882:

1860 to 1869. Placer gold	$5,812,000
1870. Placer and lode gold	125,000
1871. Placer and lode gold	100,000
1872. Placer and lode gold	133,000
1873. Placer and lode gold	230,000
1874. Gold and silver	223,503
1875. Gold and silver	104,258
1876. Gold, silver, and lead	90,900
1877. Gold, silver, and lead	555,330
1878. Gold, silver, and lead	3,152,925
1879. Gold, silver, and lead	10,333,740
1880. Gold, silver, and lead	15,025,135
1881. Gold, silver, and lead	13,147,257
1882. Gold, silver, and lead	17,127,402
Total to January 1, 1883	66,160,450

The relative proportions of each metal, and the amount of ore shipped in bulk to smelters of other cities for reduction, beginning with 1877, were as follows:

Year.	Tons of lead.	Ounces of silver.	Ounces of gold.	Tons of ore.
1877	175	376,827	2,750	3,300
1878	2,324	450,476	897	15,849
1879	17,650	6,004.416	1,100	18,540
1880	33,551	3,999,399	1,688	12,410
1881	38,101	7,162,909	13,182	15,639
1882	48 024	7,273,249	16,413	90,102
Total	139,825	30,287,276	36,030	155,831

My estimate of the production during 1882 is $320,000 in gold and $11,500,000 in silver. This does not materially differ from the estimates published by the local papers, in which, after deducting the value of the lead and computing the silver at its coining rate, the silver product is $11,527,000.

LA PLATA COUNTY.

This county, in the extreme southwestern part of Colorado, is rapidly growing more and more into prominence as a mining section.

Florida or *Needle Mountain district.*—Mr. Blair Burwell, of Hewit, my informant in this district, writes that 35 miles northeast of Durango and 8 miles east of Needleton, on the Denver and Rio Grande Railroad, at the head of the Florida, Johnson's Fork of the Vallecito, and Needle Creek—three streams which radiate from a group of peaks, the highest of the San Juan Range—are the three camps which constitute the Needle mines. From these mines as yet no ore has been shipped. It seems an arrangement of nature's in her laws of economy that great advantages are to bear burdens of corresponding drawbacks. So, here, one of the richest mineral belts perhaps in the world, cut and seamed by true fissures which crop out with unvarying width for thousands of feet, many of which are now shown to carry large bodies of good pay ore—following the law above, these riches are locked within snow-clad peaks over 14,000 feet high. There being no regular output of ore from which to estimate, one can only conjecture what the probable resources of the belt may be. Here are bodies of gray copper, galena, and sulphurets which for number of claims, width of veins, and grade of ore in sight are not equaled by any other camp in Southwestern Colorado. Nature's difficulties are usually overcome when the results to be attained are commensurate with the labor required, and no class of men sacrifice more to accomplish ends than do miners.

The Needles, which in June, 1881, were 135 miles from the end of the track of the Denver and Rio Grande Railroad, are now so close to it that a wagon-road will make the connection in a few months. When this is done and ore goes out it seems as if no limit can be placed upon the possibilities of what the mines may produce. Veins ranging all the way from 2 to 80 feet in width crop out and project in the form of great ledges, and the amount of ore in sight on the surface is probably not exceeded in any section of the State.

The general character of the ore found near Hewit is a white quartz and galena, very little difference being perceptible between it as found in the various parts of the district. The average grade at 20 feet depth is not less than $50 per ton in silver and traces of gold, while at the surface, where assays have been made, the average is about $10 silver. As the Needle Mountains in their formation were not badly broken, and very little slide rock is encountered, 20 feet of work is equivalent to five times that much in some other camps.

The district is not over two years old, and in consequence the development is but small, but few mines being opened over 20 feet in depth. Development has been further retarded by the natural obstacles to be overcome. The mines are located on high, precipitous mountains, and the grade of ore is not sufficiently high to pay for shipment until it can be accomplished by rail.

The Tempest Mining Company, operating near Hewit, owns the Annie, Bertie, Casey, Deputy, Economy, Hancock, Knickerbocker, Lavalette, Morton, Notre Dame, San Antonio, Shinfare, Stanley, and Tempest. Without entering into details of development of these mines, it is sufficient to say that they have been opened by shafts and cross-cuts to depths varying from 10 to 20 feet. The veins are wide, with strong pay streaks of galena and copper pyrites, yielding from 35 to 55 ounces of silver per ton, with small amounts of gold.

The Harmony Mining Company owns seven claims, as follows: The Astrakan, Buena Vista, Hailstorm, Harmony, Hewit, Keystone, and Republican.

The Columbia, Friendship, Lancaster, Monica, and Twenty-Second are the property of the Friendship Company.

The Silver Mesa Company was organized during the year. The claims owned by them number some of the oldest locations in the district, and the development averages about 15 feet. They are the Alta, Beelzebub, Belcher, Blue Jay, Buell, California, five-sixths of the Chief of the Needles, Fraction, Gulch, Jackson, Little Pittsburgh, Longfellow, Lord Baltimore, Mazeppa, Mountain Rose, Northern Aurora, Seminole, Senator, Silver Cup, Southern Aurora, Sweet William, Tennessee, Windom, and Wood.

The Pembroke Mining Company was organized at Indianapolis early in the year. Their properties, five in number, are the Iron mine, showing at the surface a fine body of magnetic iron, the North Star, Pittsburgh, and Summit, each showing the usual amount of galena ore as found in the district, the average width of the veins on the three being 4 feet, and the Pembroke, which shows well in iron and copper pyrites. Work will soon be commenced, and the results can hardly be otherwise than flattering.

The following claims, adjacent to Hewit, are worthy of mention, although they form only a part of the many valuable properties which will require but time and labor to become producing mines: Alice, Denver, Durango, Hidden Treasure, Lincoln, Lincoln Nos. 2, 3, and 4, Lucky Boy, Wabash, Washington, Aztec, C. Gift, Deadlock, Homestake, Humboldt No. 2, Little Emma, Monarch, San José, Snow Ball, Truckee, Virginia, Wall Street, Alpine, Bessie, Brookside, C. B. & Q., Copper Chief, Great Western, Humboldt No. 1, Josie Walker, Maggie Raub, Mountain Laurel, North Star, Occidental, Robert E. Lee, Santa Maria, Surprise, Tennessee, and Timber Line.

In *Vallecito Basin* Webb & Co. own a group of about 20 claims, constituting a complete mineral farm of 200 or more acres. Several of their claims are held by United States patents, while the newer locations are being patented as rapidly as possible. Among the best may be mentioned the Mayflower, Silver Wing, Northern Chief, Allie Davis, Mountain King, Black Horse, Iowa, Moonstone, Clipper, Eclipse, Judson, Western, and Cross.

The Occident has two shafts, one of 25 and one of 10 feet, and a tunnel of 25 feet, all on the vein, which is 6 feet. The vein matter is quartz, feldspar, and fluoride; the ore, galena, bismuth, silver, and gold. Five hundred pounds taken from the bismuth silver-ore body milled 105 ounces per ton in silver. From the galena streak of 14 inches the average assays have been 60 ounces silver, a trace of gold, and 40 per cent. lead.

The Eureka is opened by a 30-foot tunnel, showing a vein of 13 feet width, carrying galena, gray copper, pyrites of copper and iron, with some zincblende, average assays of which gave 20 to 140 ounces silver.

The Juno is developed by a tunnel over 100 feet long on the vein. A large amount of ore is on the dump awaiting shipment. The ore is galena, copper, and iron pyrites. A mill run of 250 pounds gave 55 ounces silver and seven-tenths of an ounce gold per ton. Average assays have given $75 gold and silver per ton.

The Dolly Varden, Iron Valley, and Scotia are equally as good properties as those mentioned.

In *La Plata district* the formation is reported to be limestone and granite.

The Century mine, belonging to Dr. Wallace, of Durango, is the leading property. It is situated on Bear Creek, and the ore is free milling, but no reliable information has been received respecting its condition or production.

The Belle Hamilton and Cyclone are near the head of Bear Creek, about 3 miles from the Century; they are among the most developed properties. The two claims join each other, a cross-cut tunnel, now in 164 feet, being run to cut the lode from a point below the junction of the claims. On the surface the lode appears to be from 30 to 40 feet in width, but the country being very much broken up, its size cannot be determined until cut by the tunnel. An assay of ore taken from a spur which was cut by the tunnel gave over $3,000 in silver. The ore is a quartz, bearing native and wire silver and running very high in copper.

The Snow Storm is situated about 16 miles northwest of Durango; the development consists of 2 tunnels, one near the upper end of the claim, and the other near the middle, the first in 20 and the second 15 feet. A contract has been let to run in a 100-foot tunnel near the lower end of the claim, to be used as a main working tunnel. Fifteen feet of this tunnel have been run. The vein, which is traceable on the surface across and beyond the entire claim, is an average of 9 feet in width, and carries mineral throughout. The ore is a white quartz, carrying gold and ruby silver. An average of 32 assays made on different samples, so as to include the entire vein matter, gave $65, while the average from selected ore assayed is fully $750 per ton. The company, in addition to developing its mine, is constructing, some 2 miles below it, a California stamp mill, with amalgamating pans and settler. It is also building a road from the mine to the mill site, and from that to the Junction Creek road, which at present terminates 6 miles above Durango.

The Tippecanoe lies near the Snow Storm; its vein is about 30 inches wide between walls, about one-third of the vein matter being very high grade ore. The ore being thus confined within a narrow compass, the mine can be worked at little expense. The vein matter is a white quartz, carrying sulphurets, ruby silver, and from one-half to one ounce gold. Nine tons of the ore, milled in different lots, netted an average of $140 per ton, while numerous assays have been made which ran $3,000 per ton. The development consists of a 31-foot shaft, from which a drift of 115 feet has been run, while from this drift several winzes have been extended. Higher up on the mountain from the shaft and drift a tunnel is being run which is in about 50 feet.

During 1882 La Plata County produced $10,000 in gold and $30,000 in silver.

OURAY COUNTY.

To Messrs. F. C. Meyer, of Ouray, O. B. Wilt, of Telluride, F. J. Cramer and E. G. Stoiber, of Ophir, I am indebted for the principal portion of the following information.

Ouray County is situated in the southwestern part of Colorado, in what is generally known as the San Juan country. It is divided into six mining districts, viz, Uncompahgre, Red Mountain, Sneffles, Upper San Miguel, Lower San Miguel, and Iron Springs.

Uncompahgre district is altogether tributary to Ouray County, though it is situated partly in San Juan. The formation of the higher mountains, Engineer, Abram, Hardin, &c., like most of the mountains in Southwestern Colorado, is trachyte, and the veins are chiefly fissures, some of which can be traced for miles, and in many instances have from ten to fifteen claims of 1,500 feet each located upon them.

The Silver Link, Climax and Epoch, Tidal Wave, and Silver Star, are on a vein which varies from 18 to 20 feet in width and shows ore croppings from 5 to 6 feet wide, which will mill 160 ounces of silver and 20 per cent. of copper to the ton, while specimens from some of these claims run up to 8,000 ounces of silver per ton. The first three named belong to the Silver Link group. The owners intend to tap the Silver Link with a cross-cut tunnel of about 1,100 feet in length, which has been run about 700 feet; this tunnel will tap the vein about 2,000 feet below the croppings. The drills are successfully run by steam.

The Crystal Group consists of five claims, of which four are on one vein. They are the Challenge, Confidence, Friend, Grand Junction, and Crystal, all full claims 1,500 feet by 300 wide. The veins are very strong undoubted true fissures in a trachyte formation, with clay gouges and soft porphyry vein matter, but the matrix of the metals is a compact, bluish quartz, containing hardly any of the base metals, only very little copper and iron pyrites, the silver being distributed through the quartz in the form of polybasite or tabular crystals of brittle silver.

The group is owned by English capitalists and worked by partial drifting on the vein and also cross-cutting. Specimen assays vary from 50 to 445 ounces in silver and 1 to 1½ ounces gold per ton, while regular mill runs give from 160 to 200 ounces in silver. The Royal Albert vein, Mickey Breene, Flag Staff, Grand Era, and many others on the Uncompahgre slope produce argentiferous gray copper ore, which in general carries, beside antimony and arsenic, a greater or less percentage of bismuth. Most of these lodes extend south into Poughkeepsie and north into Bear Creek Gulch, and here they are noted for carrying a high percentage of bismuth in their ore, sometimes with gray copper and sometimes pure silver bismuth glance. Most of the high-grade ores of this kind have been shipped to Swansea, Wales, for the purpose of saving the bismuth. On Bear Creek are the Bismuth, Bell of Ouray, Toledo, Tidal Wave, Black Bird, Black Prince, Leviathan, Union, Monitor, and many other mines carrying ore similar as above described. Prof. G. O. Koenig, from the Pennsylvania University, two years ago analyzed some of such ore from the Alaska mine in Poughkeepsie Gulch, and termed it Alaskite, in which the bismuth ran up to 21 per cent.

The Union mine, on Bear Creek, is 9,500 feet above sea-level; has trachyte for its walls, averages about 5 feet in width, with 3 to 30 inches of pay. The character of the ore is brittle, ruby, and native silver, associated with iron pyrites in a quartz gangue. Seventy five tons of ore have been sold that averaged 127 ounces and 1 ounce of gold to the ton. Upwards of 200 tons of shipping ore are now on the dump awaiting the nearer approach of the railway and cheaper freights. It is owned by a New York mining company. The development consists of a shaft 75 feet deep, a drift on the vein connecting with the shaft 225 feet, and a crosscut 150 feet.

The Union is crossed at nearly right angles by the Monitor, owned by the same company. It is developed by two levels each 225 feet and 100 feet in length. This vein is about 4 feet between the walls but similar to the Union, the ore being of somewhat higher grade, both in gold and silver.

Near the town of Ouray is the Mineral Farm, consisting of over 40 acres, four claims located parallel to each other. This is believed to be a surface deposit, and about half of the acreage is covered with mineral-bearing rock, which will run 10 to 15 ounces of silver to the ton. Streaks of ore from 2 to 4 feet in width are found containing gray copper, running from 800 to 900 ounces of silver to the ton, and in some places galena running 40 per cent. in lead and 150 ounces silver; most of the gangue, and especially the low-grade ore, is baryta spar. The one lies on lime, and several prospecting shafts have been sunk, one of which is 75 feet deep and still in ore. Lately, in the immediate vicinity of the town, some similar discoveries have been made apparently in the same stratum, and assays have been made running over 1,400 ounces of silver and considerable in gold.

Further down in the sand rock are the Great Western, Plutus, and Grand View, which show free gold, though it is principally contained in iron and copper pyrites.

The Great Western, at the lower end, is apparently some 40 feet from wall to wall, the ore being in separate streaks of about a foot wide, and divided by horses of country rock or altered sandstone. This is on the outcrop. A level has been run on one of the streaks, and large quantities of massive copper and iron pyrites taken out, some of which ran well in gold, with a high percentage of copper. The ore streaks seem to come together as the vein ascends the mountain.

Across the cañon is the Grand View. This lode breaks up through the red sandstone formation, but has not been found, nor even prospected for, in the trachyte above, as, for a very long distance above and beyond the sandstone, the mountain is gently sloping, and covered with a deep alluvial deposit, and a dense growth of pine and poplar timber. The claim runs from the river up the almost perpendicular bluff, and can be worked to a depth of at least 800 feet below the surface, by driving levels on the vein. The ore is iron and copper pyrites, blue and green carbonates of copper, and occasionally a little galena scattered through it, the gangue being a quartz porphyry. In the upper level they had ore from the entrance to the breast, and the streak varied in width from 1 to 3 feet. Mill runs of the ore taken from this level have yielded $100 to $150 to the ton, $14 to $20 being silver, the rest gold; while assays of samples have given as high as 43 ounces of silver to the ton, and 25 ounces in gold. The owners are now at work crosscutting to reach the vein in the lower level.

A few hundred feet from the Grand View is the Plutus. It breaks up through the sandstone in the same way as the former, and carries ore so similar that beyond doubt the ores and vein matter of the two have a common origin.

Northeast from here are several mines, of which two especially deserve mention, the Dexter and the Calliope.

The Dexter, between the sedimentary rock and the overlying igneous rock, has about 400 feet of levels, and shows a good ore streak. The lode is more horizontal than vertical, dipping into the mountain at an angle of about 33 degrees. The vein matter is porphyry, and the ore galena, antimonial galena, blende, and in seams of the galena are quantities of native silver in the form of wire silver.

The Calliope is developed, but it is noticeable for specimens of jet or coal, with native silver and galena.

Red Mountain district, lately a portion of Uncompahgre, has recently attracted considerable attention. This portion of Ouray County was long known for its large galena lodes, but the specimens obtained hardly ever ran more than 7 to 8 ounces of silver to the ton, until last summer some parties discovered a lode which they named the Yankee Girl. This lode shows 9 feet of solid galena running 80 ounces in silver per ton, and 65 per cent. in lead. Two shafts have been sunk on the vein, each now over 50 feet deep, showing the same amount of ore, only sometimes changing into copper pyrites, and it is reported that some runs as high as 800 ounces of silver.

The Gunston, Robinson, Genesee, Senate, Congress, Humboldt, Hudson, Orphan Boy, and others also have galena, but some of them have enough copper to make it advantageous to work the mines for that metal.

The Gunston has a vein of 5 feet in width, from which ore has run 58 ounces of silver and 45 per cent. of lead.

The Genesee shows a body of galena 3 feet in thickness, associated with copper, and it yields from 15 to 40 ounces of silver to the ton. It is about 1,000 feet southeast of the Yankee Girl, and its course appears southwest and northeast. This, however, has somewhat the appearance of a vertical fissure. The work done consists of a 20-foot shaft and a 15-foot shaft, all in ore.

The Humboldt, north of the Yankee Girl, has been opened by two tunnels, the upper of 15 feet, and the lower has been driven 25 feet; in the upper drift the ore assays from 39 to 49 ounces silver and 23 per cent. copper to the ton, and in the lower drift, 51 ounces silver to the ton and 31 per cent. copper. The overlying rock is porphyry and the gangue quartz porphyry.

Opposite the Yankee Girl group, and on the west side of Red Mountain Valley, there has been discovered a vein on which are located two claims, the Iranistan and the Bobtail. A shaft has been sunk 12 feet, showing a large body of galena; above this an open cut on the vein shows 4 feet of galena, copper, and iron; 400 feet above that, again, another working shows 6 feet of galena, copper, and iron ore; and 400 feet from the upper end there is a body of galena 10 feet in width, the vein at this point being 20 feet in width. The Iranistan has a 26-foot cut 150 feet from the west line, showing 4 feet of galena, copper, and decomposed matter, and in a 12-foot open cut, 100 feet lower down, there is a large body of copper, galena, and decomposed matter.

Running parallel with the above other vertical fissures have been discovered. One of these, the Comet, is 7 feet between the walls, and shows 3 feet of galena. The Great West is an extension of the same, and in the next gulch north, is the McIntyre, about 2½ feet between walls.

Many new discoveries will be worked all winter, and by the spring of 1883 some of the mines will show to great advantage.

The country rock is trachyte, but it has been stained by surface and percolating waters charged with iron dissolved from the innumerable seams and veins, until scarcely any of the original formation can be seen. On this account it is difficult for prospectors to trace the lodes, and it leads also to the opinion, on the part of some, that the mineral found is only in deposits and not in veins, but from the present developments in the chief mines the indications are, that they are true fissures.

In *Sneffles district* the lodes are traceable for miles and extend in many instances into the Upper San Miguel mining district, and a great peculiarity is that the lodes nearly all point to Sneffles Peak. The country rock is also trachyte with the exception of Stony Mountain and Treasure Hill, both of which are granite.

The character of the ore varies a great deal; some lodes have very high grade gray copper ores with galena, others have ruby and antimonial silver ores and bornite and very few galena lodes. There are several lodes which carry gold to a considerable extent, though only in two, the Governor and Yellowstone, has free gold been found.

In Imogene Basin, which belongs to this district, the lodes have mainly galena, though intermixed with gray copper and galena silver. The Yellow Rose, Agnes, Declaration, Hidden Treasure, Hancock, and Imogene are the most developed claims, and all of them have shipped more or less ore. The average width of these lodes from wall to wall is about 5 feet, their strike or course being about northwest-southeast, converging slightly toward the east or Red Mountain Valley.

The Yellow Rose vein is a strong fissure, has ten locations on it, and can be traced on the surface 4 miles, and wherever it crosses the highest ridge of mountains shows rich ore on the surface. The ore is principally galena, associated with iron and copper pyrites, gray copper, and blende, has a gangue of white crystalline and very friable quartz.

The Declaration adjoins the Yellow Rose. The outcrop shows a body of coarse iron pyrites, zincblende, and galena, yielding but little silver, while the underground workings, 230 feet below this outcrop, show 3 feet of galena, associated with copper pyrites and carrying large quantities of native silver and silver glance.

The Hidden Treasure is another representative lode of Imogene Basin. In the upper level there is a chimney of ore over 100 feet in length, which varies in width from 1 foot to 18 inches, and carries from 95 to 250 ounces of silver to the ton. In a lower drift, which gains, as far as driven, but little depth below the surface, the ore was galena, associated with blende, this ore carrying from 20 to 40 ounces silver to the ton, the chimney being about 70 feet in length and from 8 inches to a foot in width; and after running about 30 feet another chimney was encountered of a higher grade and running from 30 to 160 ounces, the streak widening to 3 feet. This chute, however, is a continuation downward of the one encountered in the upper drift. A mill run of some of this ore gave returns of 101 ounces of silver per ton and 42 per cent. of lead. The ore is galena and gray copper, associated with iron and copper pyrites and blende, in a gangue of white quartz. About 500 feet of work only has been done on the Hidden Treasure, 150 feet of this being a cross-cut.

The Pocahontas and First National are extensions of the Hidden Treasure, both showing similar ore.

The Hancock and Tuscola are on an adjoining vein and show for nearly their entire length on the outcrop from 1 to 2 feet of copper and lead ore, running well in silver. The other lodes of this basin are of similar character, but have not enough development to prove them.

On Ruby Mountain, which is a spur between Imogene and Sneffels

Basin, are the Wheel of Fortune, Potosi, Revenue group, and others, in which the silver predominates in polybasite and gray copper ores.

The Wheel of Fortune has a north-south trend, which makes it a cross-lode to the others of the belt. It is trachyte formation, and is about 7 feet between the walls, has soft porphyry for vein matter, and very light, white quartz as the gangue of the ore, the character of the latter being brittle silver, occasionally ruby silver and gray copper, with the blue and green carbonates of copper.

The following shows the value of shipments of ore from this mine to the Pueblo smelting works during the last six months of the year:

Pounds of ore.	Ounces of silver.	Gold per ton.
1,825	277.65	$11 98
1,663	214.54	8 88
1,022	122.14	4 96
4,729	169.29	4 96
2,881	275.91	11 98
17,473	109.37	5 99
30,572	152.60	4 96
16,999	169.20	10 75
23,879	165.08	11 98
24,000	172.00	5 16
Average.	176.40	7.96

The Potosi, a northerly extension of the Wheel of Fortune vein, has one tunnel driven 155 feet in ore and a shaft down 40 feet, also in ore, the pay streak varying in width from 4 inches to 2 feet. Some 6 tons of ore taken out in driving this level on the vein milled from 108 to 475 ounces silver, and about half an ounce of gold to the ton. The ore is of much the same character as the Wheel of Fortune, except that it has associated with it pink manganese spar and arsenical iron pyrites.

Near the Potosi is the Stonewall Jackson, with a vein 3½ feet between walls, in trachyte formation. It has the same quartz as the Wheel of Fortune for its ore gangue, and the ore is brittle silver, copper and iron pyrites, and a little blende and manganese spar, occasionally associated with the metals. One of its peculiarities is that where the iron pyrites join the quartz gangue, native or wire silver is frequently found. An assay of this white iron alone gave returns of 85 ounces silver to the ton and half an ounce of gold. Sample assays have returned 131 and 145 ounces to the ton. There is a shaft down 25 feet, and all in ore.

The Neptune, near by, is a vein about 12 feet between walls, and has a shaft down 32 feet, showing upwards of 3 feet of ore, galena, and a little copper pyrites. Assays of this ore have yielded as high as 80 ounces silver to the ton.

The Highland Chief is just below the Wheel of Fortune, is a northwest-southeast lode, and has a drift on the vein 45 feet in length, showing upwards of 3 feet of galena and gray copper ore in a gangue of white quartz. Tests of this ore have given about 100 ounces of silver to the ton.

Further west is Cumberland Basin, with the Cumberland, Nashville, Banker, Atlas, Sidney, Monarch, and others. These lodes carry mostly galena. The Sidney, which was recently tapped with a cross-cut tunnel of about 500 feet in length, has shown a large body of this class of ore.

In *Virginius Basin* are the Terrible, Tornado, Bank of San Juan, on the same lode as the Sidney. They show to a great extent the same character of ore, and the Terrible and Bank have large ore-bodies in sight.

The Terrible varies in width from 4 to 10 feet. It is in trachyte formation, with soft porphyry vein filling and a clay gouge. The ore is galena and gray copper in a quartz gangue. Native and ruby silver has also been found in this ore, the native being in wire. The development consists of 700 feet of levels. The following mill returns of some of the ore sold will demonstrate its quality:

Returns.	Ore.	Silver to the ton.	Lead.
	Pounds.	*Ounces.*	*Per cent.*
No. 1	60, 400	404	40
No. 2	7, 172	66½	30
No. 3	1, 463	343	59
No. 4	5, 318	116½	48
No. 5	8, 517	123. 66	46

The Virginius, Monongahela, Blue Grass, Raleigh, Shamrock, and Spotted Tail are on one and the same vein. The mill runs from some of the claims are as high as 500 ounces of silver to the ton and 48 per cent. in lead.

In the Virginius the ore is galena and gray copper of a very high grade. The average width of the vein is about 4 feet, and the pay streak varies in width from 3 to 10 inches, the average yield of the ore being 315 ounces of silver to the ton. With about 1,500 feet of levels and 370 feet of shafts this mine has sold ore to the value of $75,000, with between 300 and 400 tons, running from 50 to 100 ounces silver to the ton.

On the same vein as the Virginius and the adjoining extension is the Monongahela, showing a width of between 4 and 6 feet, and from 1 to 2 feet of ore of the same character as the Virginius. It is developed by three levels, or a total of about 650 feet, in driving which, and without any stoping, ore to the value of $3,000 was taken out. The following will exhibit the value of the ore from shipments: 16 sacks, 163 ounces silver and 28 per cent. lead; 34 sacks, 236 ounces silver and 25 per cent. lead; 20 sacks, 215 ounces silver and 45 per cent. lead; 2,500 pounds, 169 ounces silver and 49 per cent. lead.

The next northerly claim to the Monongahela, on the same vein, is the Blue Grass, showing the same ore and developed by 2 shafts, each 150 feet, and two 50 foot levels.

The next adjoining extension is the Raleigh, with a 50-foot drift, and shows similar ore.

The Humboldt, Sailor's Fortune, Tom Paine, Bob Ingersoll, and Saint Helena are also on one vein. There are fifteen more locations on this vein which lie in the San Miguel mining district, among which are the celebrated Mendota, Sheridan, Smuggler, and Union.

On Treasure Hill are the Snowbird, Snowflake, Robert Emmet, Flag Staff, El Dorado, Black Diamond, Yankee Boy, York State, Ruby Trust, Pilot, and others; these mines carry ruby and brittle silver.

The El Dorado is a promising lode, development work only having been done, consisting of three levels, 260 feet in all, on the course of the vein, and a 25-foot shaft and 75-foot open cut, all in pay ore. The ore is ruby and brittle silver, gray copper, copper pyrites, with a small percentage of galena and a little blende, the gangue of the ores being white quartz and some baryta. The following are mill returns of some of the ore taken out in doing the dead work: One ton sold to Crooke's works, Lake City, 676 ounces silver per ton. One ton sold to Ocean Wave works, Lake City, 396 ounces silver per ton. Two and a half tons sold to Mather & Geist, Pueblo, 496 ounces silver per ton. Three-quarters of a ton sold to Windham smelter 248 ounces silver per ton. One-half ton sold to Windham smelter 138 ounces silver per ton. One and a half tons sold to Mather & Geist, Pueblo, 406 ounces of silver per ton.

On the other side of the basin from the El Dorado is the well-known Yankee Boy group of mines, comprising the Yankee Boy, Dutch Boy, York State, and Genesee. The Yankee Boy proper and the Dutch Boy are adjoining claims on the same vein, worked in a desultory manner by leasers, and by the original discoverers who are still owners. The York State and Genesee are adjoining claims on the same vein and a parallel vein with the Yankee Boy, being only about 130 feet distant. This is a fissure vein, from 4 to 6 feet between the walls, in trachyte formation, its course being northwest-southeast, and the ore ruby and brittle silver associated with a small percentage of fine galena and blende, the gangue being white quartz and some heavy spar.

The Ruby Trust has had a tunnel run 100 feet, and two drifts on the vein of 193 and 83 feet. In the lower of these drifts some very beautiful ruby silver ore was encountered, the streak varying in width from 2 to 18 inches, and containing, as well as ruby, brittle silver, gray copper, native silver, in form of wire and leaf, and yielding from 30 to 3,000 ounces of silver and $15 in gold.

All the mines mentioned, beside many others, are more or less worked and have shipped or are shipping ore, but in all cases the bulk of the ore is of too low a grade to be shipped on burros and wagons, and is awaiting concentrating works and transportation facilities.

Since September, 1882, the Denver and Rio Grande Railroad has been built within 30 miles, and this has increased considerably the shipping of ore. By next summer it is expected that the railroad will be completed to Ouray, and many mines have made preparations to take out ore. Great quantities of ore are lying on the dumps waiting cheap freight rates.

The *Upper San Miguel* district, with Telluride as its central point, comprises that section of Ouray County drained by the North Fork of the San Miguel River and its tributaries, and Turkey Creek emptying into South Fork. The first discoveries were made in 1875, but owing to the inaccessibility, distance from railroads, and disadvantages arising from these sources, very little ore was shipped until 1881, when Gunnison, the nearest railroad point, was 140 miles distant, the cost of transportation then being not less than $45 per ton.

Following up the river on the north side, the following tributaries empty into it: Remine, Eider Park, Butcher, Cornet, Marshall. Remine and Eider Basins have not been prospected to any extent. A few good lodes have been opened on Park Creek, of which the following are prominent:

The Ruby Queen and Gipsy Queen, two lodes crossing at right angles, show galena and gray copper on croppings. A tunnel is being run to tap the crossing and is now 95 feet deep. The veins are 40 feet wide, and the ore assays from $25 to $160 to the ton.

Other lodes with from 10 to 50 feet development are Lady Alice, Edgar, Castile, Argentine, Silver Giant, Last Chance, Belle Flower, Thirty-Six, &c. All carry galena and assay from $20 to $190 in silver.

On Cornet Creek are situated the Gold Chief with 50 feet of development, Gold and Silver Chief, opened by a cross-cut and 200 feet of tunnel. This ore yielded by treatment with an arrastra $60 per ton in gold. No ore has been shipped, and there are about 200 tons on dump.

Greenback lode with 120 feet development and same character of ore as Gold and Silver Chief.

The Little Mattie mine produces a chloride ore; development, 30-foot tunnel. There are about 50 tons of ore on the dump, assaying as high as $1,100 in gold and $100 in silver.

Hidden Treasure, with a 30-foot tunnel, carries chloride and galena, and assays same as Little Mattie.

Lady Ellen, with 50 feet development, Fairy Queen, with 30 feet development, ore same character as Little Mattie.

Wade Hampton, 50-foot tunnel, 50 tons of ore on dump. Mill-runs from 10 to 17 ounces in gold.

White Mountain, 30-foot tunnel, galena ore, assaying about 100 ounces silver. San Miguel lode has a 50-foot tunnel. The ore is galena and gray copper. The Keene has 30 feet of workings, and the Jennie Hawkins 50 feet with galena and gray copper ore, assaying from $20 to $200 per ton.

In Marshall Basin the most prominent vein is the Smuggler, upon which the following locations have been made: Mendota, Sheridan, Smuggler, Union, and Cleveland. The first three of these have been working and shipping ore all the season, but I am unable to learn results.

The Mendota is a full claim, 1,500 by 300 feet, the width between walls averaging about 8 feet, and showing a pay streak of an average width of about 2 feet. This mine is still in the hands of the original owners, and but little developed. The work done consists of a shaft, down 100 feet, a level at 50 feet driven 85 feet, and another from the bottom of the shaft 23 feet. The only stoping done is a place about 20 feet long and 20 feet high. Of the 2 feet of ore taken from this dead work and small stope, only about 6 inches was shipped; the other 18 inches of ore that was not shipped remains on the dump, and will yield from 50 to 100 ounces to the ton. The ore shipped yielded an average of 235 ounces of silver and $29 in gold per ton.

The Sheridan, adjoining the Mendota, is well situated for development by drifts on the vein, as a drift northward along the course of the vein, from the lower end lines, would gain a depth at the upper end lines of 560 feet. There is a narrow streak of ore in the Sheridan carrying free gold, and from this some fine specimens have been taken. The development consists of two drifts on the vein; one 140 feet long, and about 60 feet above that another 50 feet long. The vein averages in width about the same as the Mendota, and the average width of the pay streak is about 2 feet. The whole 2 feet of ore will average 50 to 70 ounces of silver and half an ounce of gold to the ton.

The Smuggler is the next claim. The development consists of a cross-cut tunnel 250 feet in length, intersecting the vein at a depth of about 100 feet below the surface; a winze from the end of this cross-cut to the surface, all in ore; a drift north, from the end of the cross-cut, and on the course of the vein, 310 feet; 80 feet from the end of the north drift, a winze to the surface, 115 feet, and south from the end of the cross-cut, a drift 140 feet. The ore contains native silver, brittle silver, silver glance, and ruby silver, associated with iron pyrites, copper pyrites, and a small percentage of galena and zincblende. The matrix or gangue of the iron is quartz and silicate of manganese. The country or wall rock is trachyte, and the intermediate vein stuff, porphyry. Only the high-grade ore has been shipped, averaging 250 ounces of silver and $98 in gold per ton. The lower grade has been allowed to accumulate on the dump, awaiting cheaper transportation.

The Union has a 115-foot shaft on the vein and a cross-cut to tap the vein 300 feet deep. Mill runs have been obtained from $100 to $1,400 per ton. The character of the ore is galena, gray copper, brittle and native silver.

The Cleveland has been developed by various cuts, tunnels, &c., to the extent of about 120 feet; no ore has been shipped.

Here the Smuggler vein breaks up into spurs; the principal one is the Grand Central, opened by a 220-foot tunnel. The ore is galena and copper. The mine is now working, and there are about 125 tons of ore on the dump. The assorted ore contains 45 per cent. lead.

Crossing Marshall Creek below the Grand Central is the Ajax on the same vein. It is developed by two levels of 46 and 270 feet, respectively; the character of the ore is similar to that of the Grand Central—fine galena and pockets of gold, assaying very high. It is owned by the Eclipse Mining Company and has four following extensions: Bobtail, 30-foot shaft, crossing into Ingram Basin; the Nero, Park View, and Union Flag; all show free gold and have about 30 feet of development.

It is reported that stamps and concentrators for the reduction of the ore will be erected the coming season.

In Marshall Basin, the Cimarron has about 600 feet of development; has been shipping ore all the season from two levels. The amount produced has been sent to Denver.

The Hidden Treasure, a parallel vein to the Grand Central, containing similar ore to the Little Mary, has two shafts of 40 and 60 feet, respectively. There are 10 tons of first-class ore and 20 tons of second-class ore on dump. Mill runs have been obtained at $600 per ton.

Red Cloud yields heavy galena ore.

N. W. H., Jr., is developed by 200 feet drift, 116 feet of shaft. A north and south drift run 50 feet, respectively. The most of the season was spent in developing. Seventy tons of N. W. H., Jr., ore were melted, yielding about $65 per ton. The character of the ore is galena, iron and copper pyrites, zinc, free gold, and tellurium. In connection with the mine there is a 10-stamp and Frue vanner gold and concentrating mill. The mine is owned by the Brooklyn and San Miguel Mining and Reduction Company.

Argentine No. 1, 750 feet; Argentine No. 2, 1,500 feet, developed by 140 feet of shaft, and 150 feet drifts. Same character of ore as N. W. H., Jr., but richer. Two tons of first-class ore were treated at the Brooklyn works, yielding about $950 per ton, nearly all gold.

Baby Elephant, 130 feet long between the Argentine and the Cincinnati, has 20 feet of development and the same character of ore as the Argentine.

Cincinnati, 100 feet development, same character of ore as the Argentine. No ore has been shipped.

These five, the N. W. H., Jr., Argentine Nos. 1 and 2, Baby Elephant, and Cincinnati, are on what is known as the Big Elephant vein.

The Flora has 70 feet of development. The ore is of gold and silver and tellurium. By mill run it yields 14 ounces in gold and 10½ ounces in silver per ton.

The Shamrock extension on the Elephant vein has the same character of ore, and 60 feet of development.

The Sneffles on the Pandora vein has 40 feet of development. Three tons of ore were shipped with satisfactory returns.

I. O. N. and Black Crook have 30 feet each of development, gold ore, $15 to $32 per ton.

Aria Adna, Mary Bell, and Birmingham have 110-foot tunnel, and the character of the ore is galena and copper.

The Pennsylvania is an extension of the Birmingham. It is opened by a tunnel 61 feet in length; the ore is chiefly galena, copper, and iron carrying gold.

The Tioga has a 60-foot tunnel; the ore is of same character as in the Pennsylvania.

The Little Ella and Robert E. Lee each have 90 feet of development; the ore by mill runs yields $120 to $1,200 in silver.

The Bradley is an extension of the Cimarron, and has ore of the same character.

The Alamo is developed by 96 feet of tunnel, and a 50-foot cross-cut; the ore is free-gold bearing.

The Como and Abington are extensions of the Alamo, but have not been developed to as great an extent; the ore, however, is similar, and yields by milling $55 per ton.

The Pandora and Oriental are owned and operated by a French company, which has expended about $300,000 in their development and in surface improvements. The mine has upwards of 1,500 feet of development; the mill is equipped with 20 stamps and 16 Frue vanners.

In Ingram Basin, the Snow-drift, Leftwick, and Neptune, on the same lode, have each about 20 feet of development; the ore is heavy galena, assaying from $7 to $53 per ton.

The Jay Gould and Bo Peep have about 30 feet of workings. The ore in the first named is galena, carrying free gold, while that of the Bo Peep is a solid vein of galena, 2 feet wide.

The following mines are but little more than prospects, upon which only assessment work has been done; the ores are mostly of galena: Comstock, Tip Top, Sundown, Monitor, Osa, Governor, Bay State, J. Alton, Huerfano, Yulu, Meserole, Blake, Broad Gauge, James Park, Brooklyn, Puzzle, Ouray, Arctic Region, Last Chance, Little Ella, Pioneer, Louisa, Constantina, Minnetonka, Little Maude, Climax, Chipmunk, Champion, Chieftain, Florence, White Bear, Andros.

In Bridal Vail Basin, the Pretty Pariera, Rieta, Lily, Pride of the West, Umbus, Santa Anna, Pulaski, Riverside, Susquehanna, Royal, Blanche Getto, American Exchange, Adelphi, Lucille, La Crosse, Little Eddie, Lake Mona, Stonewall Jackson, Cranky Ann, Last Chance, King Solomon, Ella Freeman, Eureka, Wisconsin. These are prospects with from 10 to 50 feet development, carrying both gold and silver. The Lewis has 140 feet of development and 40 tons of ore on dump. This mine shipped some ore in 1882, the average value of which was $60 per ton.

The Jumbo, Dan Rice, and West Point are new discoveries, the ore is rich in silver, and preparations were made to continue operations all winter.

The Ben Franklin is a good silver prospect, upon which but little work has been done.

In Upper San Miguel Park the Henson carries free-gold bearing ore, assaying $300 per ton.

The Day's Length has 20 feet of tunnel, showing galena assaying $42 in silver per ton.

The Sundown and Coleman also yield silver, and the Bob Ingersoll gold.

The Boomerang is supposed to be a contact vein; has a tunnel 35 feet in solid galena stripped about 200 feet on surface; character of ore is galena, iron, copper, carbonates, &c. There are about 400 tons of ore on the dump, assaying from 20 to 30 ounces in silver. No ore has been shipped.

On Bear Creek, on the south side of the park, the Arion, with 20 feet of development, yields ore assaying $100 in gold per ton.

The Golden Cloud, with similar development, assays $70 in gold.

The Euclid Avenue is opened by 3 levels of 68, 60, and 30 feet, respectively. The pay streak is about one foot in width. A shipment of 88 tons of ore to the Golden Group mill yielded at the rate of $70 gold to the ton.

The Sylph has a 4-inch pay streak assaying $30. It is developed by a 50-foot tunnel.

The Crystal is opened by 100 feet of tunnel, showing a foot of pay ore averaging $60 to the ton; from 20 to 30 tons have been milled.

Little Maggie Wortze has 30 feet of tunnel and two pay streaks of gold-bearing ore.

The Damon also has two pay streaks, but the development is insignificant in amount.

The Ora Bonita, Little Darling, and Forest City are owned by the Upper San Miguel Gold and Silver Mining Company, and are developed by from 20 to 30 feet of work. The company has a 10-stamp mill and Blake crusher, but are not ready to run; their ore during 1882 was worked at the mill of the Golden Group Company.

The Golden Group Company own a number of fine claims.

The Star has a foot vein of sulphide ore opened by a tunnel 200 feet in length.

The Northern Ohio has 165 feet of tunnel and a vein of gold-bearing ore 3 feet in width.

The Caution and Kokomo each have a small amount of development.

The Golden Chief was worked by a force of 6 men; 300 feet of tunnels were driven; the vein is about 20 inches in width.

The Savage is an eastern extension of the Golden Chief. It was located in 1878, and has been opened by 2 drifts aggregating 300 feet. The vein is nearly 3 feet wide, and the ore assays from $20 upwards. Some exceedingly rich specimens have been extracted. The ore taken out was milled at the works of the company.

The Tiger is on the same lode, and is the adjoining claim to the Savage; 16 inches of ore are exposed by a tunnel 75 feet in length.

The Kansas has a large vein of upwards of 6 feet in width. The ore is free-gold bearing, assaying from $12 to $25. This mine has only about 40 feet of development.

The Colorado and Lizzie Sheridan are also owned by this company. They both show good pay streaks for a small amount of work.

The Great Eastern and Queen Mary have fair-sized ore-bodies, assaying from $20 to $100 in gold.

The Mayflower and Elizabeth are the property of the same company. The latter is an old location, and has an unusually strong vein, yielding ore of the average value of $80 per ton.

The Golden Group Company was organized in 1878; has 10 stamps, 2 vanners, and other buildings on the grounds, but, owing to bad management, did nothing until fall of 1881, when they made a test run. In July, 1882, the mill began working and ran until fall, closing down for want of ore. The company has expended about $80,000.

The Nellie is opened by two drifts of 64 and 104 feet, respectively, with a 4-foot pay streak of gold-bearing ore, which assays $20 per ton.

The Ella and Golden Wedge are the western and eastern extensions of the Nellie, and both have a small amount of development.

The Golden Shaft adjoins the Golden Wedge on the west, and has three drifts, aggregating 125 feet in length. The vein is about 2 feet wide, and the ore assays from $20 to $100 in gold to the ton.

The Wasatch is in progress of development by 3 tunnels, which, however, have not as yet attained any great depth. The ore is good, although the pay streak is narrow.

The Silver Chief, Wild Yankee, and Excelsior.—No work but assessment has been done, except on the Silver Chief, which has 114 feet of tunnel. A 4-foot pay streak carries galena, copper, and zinc. A crosscut tunnel runs to strike the vein 200 feet deep. It is now 75 feet under cover. The ore averages from $33 to $2,600 silver. One hundred and seventy-five tons are on the dump. The mine was located in 1877.

The Carlotta is on the same vein, and the ore is of a like character.

The Fairview, Jennie Baxter, Black Wonder, and Hielman are all developed by from 20 to 75 feet of tunnels. The veins are from 2 to 5 feet in width, yielding gold.

The Snowdrift produces sulphide of silver, which was shipped by pack animals to Ouray and reduced at the Norfolk and Ouray works.

The John Borland is an eastern extension of the Snowdrift, and has the same character of ore, which was also shipped to Ouray for treatment.

The Arctic is on the same vein, to the east of the John Borland. It has but slight development.

The Caslator, Caucasia, Ithaca, Utica, San Joaquin, and Charles Sherman yield silver ores, and the Pocahontas, Ikey, and Tom Ballard are gold bearing. From the latter, 20 tons of ore were shipped in 1882, which yielded an average of $100 per ton.

The Gibraltar lode is reported to be 125 feet wide, carrying gray copper and galena, which assays $216 in silver per ton.

The Ivanhoe has a small pay streak of about 8 inches, which yields $80 in gold and a small amount in silver.

The Andalusia, Simon Pure, Shamrock, Busch, John Brown, Tip Top, Stephen Girard, X Y Z, Euclid Avenue No. 2, Mollie May, Oneida, Orphan Boy, and Sam Peters are gold prospects which may prove to be valuable mines when developed.

In *Lower San Miguel district*, on Mount Wilson, there are a number of prospects carrying galena and gray copper, assaying from $108 to $700 per ton. Among the principal ones may be mentioned the Cow Boy, Fanny Forest, American Girl, Western Wonder, Black Prince, Lone Star, and Saint Julian.

On Prospect Creek the mines have been better developed.

The Golden Thread, with 40 feet of development, shows 3 feet of vein matter, assaying from $15 to $75 per ton in gold.

The Monticello has been opened 100 feet; the pay streak is narrow, yielding silver ore.

The Montana, Hancock, and Bilk are similar in development, although the veins are wider.

On Turkey Creek, in North Basin, the Mountain Quail is opened by a tunnel of 150 feet, showing a vein of gold and silver bearing ore, which is 7 feet between walls and assays from $20 to $4,000 per ton.

The Mountain Sheep has 125 feet of work. The ore is chiefly of gold; the vein is wide, and assays from $50 to $250.

The Confidence has 20 feet of development and yields free gold bearing ore of the value of from $50 to $80 per ton.

The Gold King extension has 3 feet of gold ore and 50 feet of development.

The Palmyra has a 300-foot tunnel, ore gray copper and galena in iron spar gangue, vein 5 feet, ore streak 18 inches, average assay 300 to 900 ounces.

The Crown Jewel has 150 feet of tunneling on a galena and gray copper ore vein, several tons of which have been shipped.

The Turkey Creek group comprises the Pocahontas, West Virginia, Lexington, Sunnyside, Norfolk, Silver Cloud, Harriet Lane, Luciel, Vienna, and Black Iron, and three adjoining mill sites. One cross-cut opens all these lodes.

In South or Gold King Basin are the Gold King and Minnie Myrtle, owned by Messrs. Brown & Warner.

The Gold King has a 4-foot pay streak, the ore from which averages by mill run $50 in gold per ton.

The Minnie Myrtle has about 250 feet of development. The ore carries both gold and silver. The owners of these mines erected a 10-stamp mill with vanners in 1880, and are increasing the capacity by 10 stamps. Their mines are located high on the mountain, and the ore is taken to the mill by a Hallidie tram 2,600 feet in length.

The Alta belongs to the Silver Mountain Mining Company, which has been actively developing it since 1881. The present workings consist of 3 levels aggregating 700 feet. The ore is gray copper and sulphuret, which is found in streaks and pockets.

Other promising properties in this basin are the Black Warrior, Olympic, Porcupine, Duchess, Viola, Emperor, Montezuma, Hancock, Dixie, Rob Roy, Grand View, and the Little Girl.

There are also in the San Miguel district extensive and rich auriferous gravel deposits which extend from the foot-hills of the San Miguel Mountains to the confluence of the San Miguel and Dolores Rivers, a distance of 90 miles. The present bed of the river has cut through the older deposits, leaving immense bodies of gravel often upon both sides of the river, varying in width from a few rods to one mile, and in depth from 25 to 150 feet, and left the bed-rock of the old deposits at an average elevation of 20 feet above the present river bed. But a very small proportion of the gravel has been opened. The distance from any base of supplies and high price of labor have rendered development slow. Several bars have been partially opened with the result of showing that with proper management large returns could be realized.

The Keystone Placer during the past two seasons has been operated continuously with very successful results.

The Saint Louis and Lower San Miguel Placer Mining Company, after expending $30,000 and making a trial run, with the result of cleaning up $1,300 from 2,200 cubic yards of gravel, became involved in litigation and was forced to suspend operations.

The Keokuk Hydraulic Mining Company purchased during the past 18 months the large bodies of gravel known as the Kansas City and Montana bars, and proceeded to develop them by a ditch 11 miles in length, which they have recently completed.

Four miles above the mouth of Leopard Creek are situated the Wheeler bars, upon which a tunnel 8 feet high, 5 feet wide, and 96 feet long, produced over $4,000. The Willow Creek bar, owned and operated by a party of Pennsylvania capitalists, has produced an average of 75 cents per cubic yard of gravel for all washings upon their claim. Whatever prospecting has been done upon the river, the result has been in every case to prove that with improved hydraulic machinery the gold output would be both large and continuous.

Iron Springs district is situated in the southern part of the county, adjoining San Juan and Dolores Counties.

It is a small district, covering the drainage of Howard's and Lake Forks of the South Fork of the San Miguel River. Ophir is the center of the district.

The mines, as in San Miguel district, are of two kinds—of gold-bearing quartz and those containing galena and gray copper.

The Summit mine is situated on the divide between Iron Springs and Upper San Miguel districts, or on top of the range between Ophir and Turkey Creek Basins. The development consists of an upper tunnel of 350 feet; tunnel No. 2, of 530 feet, the two connected by a winze. Both tunnels and winze are on the vein, which is a clearly-defined fissure, 5 feet between walls, and a shaft of 40 feet from tunnel No. 2, also on the vein. Below these workings tunnel No. 3, a cross-cut, is in 135 feet. The ore, a sulphuret and galena, averages in large lots 150 ounces silver and a good percentage of lead. About 700 tons of ore have been shipped to Silverton, which averaged about 175 ounces of silver to the ton.

The Tip Top and Lookout, adjoining the Summit, belong to the Duquesne Mining Company of Pittsburgh, Pa. The Tip Top is worked through the upper tunnel of the Summit, having a 150 foot drift. The ore in quantity and quality bears a marked resemblance to the Summit ore.

The Lookout has a 60-foot shaft with a 60-foot drift from the bottom, both on vein; a cross-cut to reach the vein at 300 feet is nearly in. Two pay streaks are found on the Lookout, one of galena and one of chlorides. Lookout ore averages at mill 135 ounces per ton. Both Tip Top and Lookout are shipping ore.

The Nevada mine, on Yellow Mountain, has shipped 162 tons of ore, which netted the owners $32,711. The developments consist of a level of 300 feet in length, a second level of 275 feet, and a cross-cut of 285 feet. A second cross-cut is being run, which will be completed by April 1, 1883. The stoping amounts to 275 feet by 21 feet.

The Caribou, also on Yellow Mountain, has shipped about 240 tons, which netted about $90 per ton. The workings consist of a shaft 175 feet in depth, a cross-cut of 200 feet; the first level from the cross-cut extends west 270 feet and east 100 feet. From this level a shaft has been sunk 132 feet. The second level is 60 feet below the first and extends 100 feet west and 80 feet east. Sixty feet below is the third level, which has been run 140 feet west and 100 feet east.

The Nevada and Caribou mines are under the efficient management of Mr. Mark Folsom, from whom the above facts were obtained.

The Butler mine, also on Yellow Mountain, is well developed, having a cross-cut tunnel of 180 feet, a shaft of 125 feet, 300 feet of levels from the shaft, and 50 by 90 feet of stoping from the levels. On the opposite end of the claim from this work is a shaft of 30 feet, and near the center a shaft of 20 feet. The existence of three distinct veins has been determined. About 25 tons of ore have been shipped, averaging $175 per ton.

The Vulcan has a 30-foot shaft with a 20-foot cross-cut from the bottom; shows a vein nearly 30 feet wide, with mineral scattered throughout. The ore is similar to the Butler, the property being merely a continuation of the latter good mine. Assays run from 50 to 500 ounces per ton.

The Silver Bell has shipped 220 tons of ore averaging 175 ounces per ton.

The Tidal Wave is a new discovery; about a ton of ore from the surface yielded $820.

On the Magnolia a tunnel of 115 feet in length and 6 feet wide enters the vein alongside the foot wall, and continues for a distance of 60 feet to follow the same, then to the right, and at right angle to the entering tunnel the vein is cut across for 24 feet, where a pay streak of galena, gray copper, and iron pyrites is exposed and followed for a distance of 31 feet. This pay streak runs parallel to the 60-foot tunnel, and is from 12 to 24 inches in width. The gangue matter in this vein is an easy-working quartz. The mineral assays 450 ounces silver and $14 to $20 gold per ton.

The Big San Juan Mining Company commenced operations on the Mohawk mine in September. This mine is on Silver Mountain, near Ophir, some 2,000 or 2,500 feet higher than the town, and about 12,000 feet above sea-level. It is a true fissure carrying galena and oxidized lead ores with some gray copper and iron pyrites; also native silver in small quantities. The developments are 100 feet of shafts and 175 feet of drifts. The production, owing to the limited time the mine has been in operation, was small; the ore averaged 113 ounces of silver to the ton and 34 per cent. of lead.

This company owns also the San Juan mine on the base of Yellow Mountain. The development consists of two drifts on the vein, each 70 feet, and about 100 feet apart. In the upper drift near breast a shaft 25 feet, and the first work of the original locators, consisting of several adits exposing the vein, which has widened with depth in the upper level, being from 20 to 30 inches, at the bottom of shaft 3 feet, and in lower level 7 feet. Where the vein is 3 feet at bottom of shaft, one-third of the vein matter averages 90 to 130 ounces silver per ton, the ore being a gray copper in iron spar gangue, with small amount of quartz. In the seven-foot vein as found in the lower level there are two pay streaks, the gangue matter of each being quartz. The ore of one is a galena and sulphuret, averaging over 250 ounces silver per ton. The other streak has a gray copper ore which averages 130 ounces silver.

The gold veins of this district have been but little worked during the year, with the exception of the Globe mine, from which 5,000 pounds of ore were shipped to Denver.

There are numerous gold-bearing lodes in the district, but they are chiefly in the hands of their discoverers, and have been but little developed, with the exception of the Osceola group, which shows a large amount of excellent gold quartz.

Ouray County produced during 1882 about $80,000 in gold and $150,000 in silver.

PARK COUNTY.

Park County is the geographical center of the State, and covers an area of 60 miles in length by about 40 in breadth. The principal portion of the county is an elevated plateau known as South Park, surrounded by high ranges of mountains.

The mineral belt lies in the western part of the county on the eastern slope of the Continental Divide for about half its length, and the remainder on the Mosquito Range, which separates the headwaters of the Platte River from those of the Arkansas. The length of the belt is about 40 miles, and it is from 5 to 10 miles in width.

Montgomery district was one of the earliest-organized mining districts in the State, with the town of Montgomery—now long deserted—as its principal camp. The district is situated in the main range of mountains northwest from Fairplay and contains a number of promising mines.

The Russia, on Mount Lincoln, is the property of the Russia Mining Company. The vein is a contact with a pay of about 1½ feet carrying galena, gray copper, sulphurets, brittle silver, and copper pyrites. The developments consist of a tunnel with side drifts and levels. During the year about 150 feet of drifts were run and from 75 to 100 tons of ore extracted, which is reported to assay at the rate of $500 to the ton.

The Occidental is situated above the Russia. It is in lime and near a porphyry dike. It is developed by about 250 feet of shafts and drifts. The pay is from 2 inches to 2 feet in thickness. Three drifts on the vein are now being run with a view to open up the ground in proper shape for economical working. Several chambers or pockets of ore have already been opened, but no ore is being taken out other than that encountered in drifting. From 75 to 100 tons were shipped to the Boston and Colorado works, which ran from 150 to 400 ounces of silver to the ton. The mine is owned by Nelson Hallock and J. W. Hoppy.

The Present Help mine is one of the most valuable properties on Mount Lincoln. It is in a lime formation and similar to the celebrated Moose mine on Mount Bross. The developments consist of about 280 feet of tunnel and cross-cuts with suitable surface improvements. The title to this property has been in litigation for some time past, and the mine has remained idle, but the difficulties have been practically settled, and it is reported that operations will be resumed in the spring of 1883.

The Reverie, situated below the best mines on the mountain, has a wide vein, the outcrop of which can be traced over 1,800 feet, and is opened by a tunnel of 50 feet, showing well-defined walls.

The Danville Consolidated is situated on Mount Lincoln and near the Russia; but very little developments have been made the past season, but from 25 to 30 tons of mineral have been shipped that mills from 50 to 200 ounces in silver per ton.

The Orion is a new discovery southwest of the Russia. The ore from near the surface runs high in silver and copper. Sufficient work has not yet been done to determine the form and size of the vein, but the indications point quite clearly to a valuable contact. As this property is situated below the Present Help, Russia, Occidental and other working mines, it is very easy of access, being reached by a good wagon-road, and with but little work will be made a very profitable mine.

The D. H. Hill has been extensively developed, and produced from 40 to 75 tons of ore during the year.

The Wilson produced from 100 to 150 tons of ore that milled 75 to 150 ounces in silver per ton and contained 40 per cent. of lead.

The Bullion was developed the past season by about 150 feet of drifts, and has produced from 25 to 40 tons of ore that mills from 100 to 225 ounces silver per ton. It is owned by the New Haven Silver Mining Company.

The Chicago near the Occidental remained idle for the greater part of the year.

On the northeastern slope of Mount Lincoln are the Geranium, Taylor, and Taylor Extension, all discovered within a recent period. At a depth of 14 feet they show a vein 7 feet in width between well-defined walls. The ore is a gold-bearing quartz, a fair assay giving 3 ounces in gold and 8 ounces in silver per ton. The work of development is being rapidly pushed. A tunnel is being run on the Taylor Extension and a shaft sunk upon the Taylor.

On the B. B. and G. mine, 2 miles above Montgomery, and on the lower part of the mountain, the vein is about 4½ feet wide, showing an assay of gold 5½ ounces, $108.42; silver 512 ounces, $578.56; total, $686.98. This claim has been developed but little as yet, although work is being pushed vigorously.

The Pioneer Mining Company own a large number of claims in this district which form a compact group. A tunnel has been projected to cut all the principal veins.

One of the principal claims of the company, the Nova Zembla, has been explored to the depth of over 200 feet, showing at the bottom ore running $200 in gold and some silver, thus showing that the true fissures are not only holding their own but getting better as a greater depth is attained. In going down on the Nova Zembla over 600 tons of ore were taken out, averaging, when treated, $60 per ton. The tunnel will cut this vein at a depth of 700 feet. The company has a 20-stamp mill, which has been thoroughly refitted and furnished with late improvements and appliances for concentrating and milling ores.

The Kansas, owned by the Kansas Mining Company, is an extension of the Nova Zembla. The vein, which is one of the largest and best in the district, is opened by tunnels and open cuts for a distance of fully two-thirds the entire length of the claim—1,500 feet. The cuts, shafts, and tunnels on the vein are fifteen in number. The vein is tapped from below by two tunnels, one of 80 and the other of 130 feet. The mine is now so arranged that the long tunnel below can be used for a main working tunnel, and from the upper tunnels the ore can be stoped down through winzes and shafts, and all brought out at the working tunnel and then into the mill, only a few rods distant. The width of the Kansas ore vein is from 2 to 8 feet. The ore carries from $10 to $150 in gold, the average being over $40 per ton. Nearly one-half of this can be saved in the stamp mill by amalgamation, and the remainder can be treated by concentration and smelting. The mine is equipped with a very complete 10-stamp mill.

The Tippecanoe, on the opposite side of the Platte River from the Kansas mine, is a valuable claim, belonging to Taylor, Ruark & Murphy. It is developed by an open cut and tunnel of 12 feet and a shaft of 15 feet, showing 3 feet of galena and sulphuret ore that assays 322 ounces of silver to the ton. Work on this property will be extensively carried on the coming summer.

Buckskin district is an old mining section, in which the surface ores were worked for gold until the refractory sulphurets were reached, and the mines then remained idle or were abandoned. Subsequently rich silver discoveries were made on Mount Bross, and since then the growth and development of the district have been steady and permanent.

The Moose mine, near the summit of the mountain, has been, and still is, one of the famous mines of the district. It comprises about 165 acres of mineral lands, and has been worked extensively for a number of years, there being several miles of tunnels, drifts, cross-cuts, winzes, &c. But little development work was accomplished during the last year, as the mine was operated under lease. The shipments of ore amounted to from 150 to 200 tons. The ore in the Moose has run from first to last between 60 and 900 ounces silver per ton, the average for the past two years being about 200.

The Dolly Varden, south of the Moose, consists of about 150 acres, and is the property of Hall & Brunk, who are the original locators of the mine. It has been steadily though not vigorously worked since its discovery. The output of mineral from 1872 to 1882 has been from 15,000 to 20,000 tons. The average of the ore is not less than 150 ounces to the ton. About 250 feet of drifts were run during the last year, and 250 to 300 tons of ore produced. A large force of men had been employed during the year, but in September all but five were discharged.

The Silver Gem is west of the Moose. It is developed by about 1,000 feet of tunnel and drifts, of which about 100 feet were run during 1882. The ore is galena and sulphurets, yielding from 60 to 250 ounces of silver per ton. The mine produced 100 tons during the year.

The Guinea Pig, in the same vicinity, was worked under lease, and it is reported that some exceedingly rich mineral was struck.

The Commercial, on the western base of Mount Bross, at the head of Buckskin Gulch, exhibits a well-defined fissure vein, extending the full length of claim, from 3 to 4 feet in width, with a pay streak of from 12 to 18 inches of gray copper, galena, and iron pyrites, carrying silver and gold. There is a shaft 21 feet, with 16 feet of drift on vein at that depth, and a tunnel about 100 feet below the shaft on a 4-foot vein.

The Wyandotte mine, in upper Buckskin Gulch, is rapidly growing into prominence. Two principal tunnels are being pushed on the vein, two winzes are sinking to connect the levels, and a cross-cut tunnel is pushing in toward the vein from a point on Democrat Mountain that can be reached by wagons. The lower tunnel is in nearly 60 feet, and the mineral streak has widened out to a minimum average of 15 inches. The ore runs from $300 to $3,000 per ton, according to assortment. In the upper tunnel, which is about the same distance as the lower, and which, owing to the formation of the mountain, has already attained a greater depth from the surface, there are two veins of mineral. The principal one is the gold vein shown in the lower tunnel, and which lies on the hanging wall. This maintains the same character and value as shown below, and has continued to improve. Lying along the foot wall is the 8-inch vein of decomposed quartz, running well in gold and silver, and also carrying about 12 per cent. of copper and a good percentage of lead. Another tunnel is projected to tap the vein 125 feet below the upper tunnel. This will give a large stoping ground, and materially increase the output of ore.

The Iron mine, belonging to the Glasgow Mining Company, at the head of Buckskin Gulch, has a horizontal vein of mineral 4 to 6 feet in width, covered by a 25-foot cap of iron, and lying on the lime rock. This iron cap of itself is a very valuable adjunct to the company's properties. The smelters pay $3 per ton for the iron ore on the dump at the mine, to be used for fluxing purposes. One mill run of 3½ tons from the vein proper of the Iron mine gave 120 ounces in silver per ton. Another of 2 tons gave 260 ounces. The Iron is opened by a 55-foot tunnel and a 35-foot shaft.

Nancy C. is in granite formation, the vein being about 3 feet between walls. The vein matter is a porphyry gangue, carrying iron, copper, and galena, which mills about $30 per ton in gold and silver. This mine is the property of White, Mullen & Co., and is opened by about 35 feet of tunnel.

The Colorado Springs group, on the west slope of Mount Bross, is the property of Becker, White, Cowell, and Mullen. It comprises ten claims, viz, Colorado Springs, Becker, Tiger, Dominion, Ottawa Boy, Irene, Duke of Edinburg, White, Cowell, and Mullen. The development consists of upwards of 600 feet of shafts, tunnels, and levels, of which 75 feet were driven during the past year. The ore mills from 75 to 400 ounces in silver per ton.

The Iron No. 2, situated south of the Colorado Springs group, is a contact vein between white and blue lime. The ore is iron, heavily stained with copper, and assays 150 ounces in silver and a half ounce in gold per ton. The vein is from 3 to 5 feet in width. It is owned by Mullen and Chandler.

The Little Ross, on the western slope of the mountain and south of the Colorado Springs group, is a contact between lime and quartzite. It is developed by about 150 feet of tunnel and drifts; 60 to 100 tons of ore were produced and shipped during the year that milled 150 ounces in silver per ton. It is the property of Stephens, Johnson & Co.

The Great West Mining Company's property consists of 70 acres. The work heretofore has been chiefly developmental, and the mine is now in a shape to make a continuous output of ore.

The Adrian has been quite extensively developed the past season. The vein is a contact, carrying iron, copper, and some galena; mills from $40 to $120 in gold and silver. It is owned by the Great West Mining Company.

South of the Great West is a group of mines owned by the Pennsylvania Consolidated Mining and Milling Company. It comprises the Excelsior, Pennsylvania, Young, Blue Tiger, Gray Eagle, Sunny South, and the Golden Star placer.

The Excelsior is one of the old gold mines, which was worked with much profit in Buckskin's early days, but after the surface ores were exhausted it remained idle until it became the property of its present owners. It is a contact vein between quartzite and lime. During the season of 1881 the principal work of the company consisted in cleaning out, retimbering, and prospecting. The developments now consist of a shaft 115 feet in depth, a tunnel 155 feet, and numerous drifts and levels. While this work of cleaning out was in progress several tons of ore were taken out and treated, averaging 135 ounces of silver and 2 ounces of gold per ton. In addition to this, large quantities of low-grade ore were exposed, which, by concentrating, will yield handsome returns to the company. The ore in the Excelsior is sulphurets of silver, galena, gray copper and pyrites of copper, carbonate of iron, and lead, with occasional intermixture of crystallized lead.

The other claims of this company have less development, but are good mineral veins.

A tunnel has been projected to intersect all the veins, and when completed will greatly facilitate extracting ore, as well as drain the mines and save the expense of sinking shafts and pumping.

The Criterion, also a contact between lime and quartzite, is situated below the Excelsior. It was worked at an early day as long as the ores continued to be free-milling quartz, which paid from $20 to $50 at the old stamp mills. The mine, then known as the Bates lode, began to fill with water and the ore to run into silver and galena, which could not then be treated, and work was abandoned. From that time until the present the property has never been long without a claimant, but no practical work was done until the present owner took possession, and a tunnel was projected to drain the mine. This tunnel enters the mountain a considerable distance below the old works of the mine. Two hundred and thirty feet of tunneling was necessary, and after the mine was unwatered it was used as a main working tunnel. It is now in about 400 feet, exposing a large body of decomposed quartz and galena that mills from 20 to 150 ounces of silver to the ton, besides considerable gold.

The Silver Wave is a short distance east of the Criterion, and is situated on the same line of contact. It is opened by from 100 to 125 feet of tunnels and drifts. No ore was shipped, but 75 tons are on the dump that will run from $25 to $40 to the ton in silver and gold.

The Galveston, similarly located, has 70 feet of tunnel on a vein of galena and iron that mills 15 ounces of silver and 50 per cent. of lead.

The Ten-Forty, below the Galveston, has been developed by from 100 to 150 feet of drifts. The ore yields 150 to 200 ounces of silver to the ton.

The Little Esther, below the Criterion and upon a direct line between the old Phillips workings and the well-known Ten-Forty, is showing a solid body of fine-looking mineral across the bottom of its 30-foot shaft. The walls are well defined, and the ore will mill in bulk $160 in gold and silver.

On Loveland Mountain, on the southwest side of Buckskin Gulch, is the Fanny Barret, covering about 165 acres of mineral lands and comprising 16 claims. The property extends over the crest of the hill into Mosquito district, but the chief work has been done on the Buckskin side and consists of two tunnels of 130 feet each, a shaft of 80, and another, the main working shaft, of 175 feet in depth, and from this last shaft about 700 feet of levels and numerous drifts. All the ore which has been taken out, probably over 1,000 tons, is that which came in the way of development work. Of all the ore mined thus far, 200 tons have been treated, the remainder, about 800 tons, remaining on the dumps for treatment in the smelter which the company have erected on their mill site at Alma.

The Abington, northwest of the Fanny Barret, is situated high on the mountain and belongs to the Abington Mining Company. The mineral belt on this property can be traced several hundred feet on the surface, showing gold in quantities ranging from 2 to 5 ounces in surface croppings near the southwest part of the principal claim, while within 200 feet of the northeast end of the same claim, silver is found. Near the center of the claim are the Abington workings, where, at the depth of only 15 feet, the main body of the mineral is exposed; the vein being horizontal, of 4 to 5½ feet in thickness between the porphyry and lime rock. While the work has been principally of a developing nature, considerable ore has been taken out and treated, realizing on an average $130 per ton. The developments consist of two open cuts, about 100 feet of shafting and levels, with some side drifts of a few feet each into the mineral body proper, and good substantial buildings for dwelling, shaft, and ore houses.

The Buena Vista adjoins the Fanny Barret. Only assessment work was done during the year.

The Connoran, below the Fanny Barret, is comparatively a new discovery. Development consists of a shaft-house and 30 feet of shafting. The shaft from near the surface has been on a vertical vein of mineral, which widens out every foot of the way down. At the bottom of the shaft is a pay streak of not less than 20 inches of a galena and chloride ore, which has given mill runs of from $40 to $112. Out of this 30-foot shaft alone have been taken 8 tons of ore which were shipped away for treatment at a fair profit.

The Northern Light has a record as a shipper of pay ore in 1862, and will again come to the front as a producer. A tunnel pierces the mountain for a distance of 105 feet, and at its breast a shaft has been sunk 110 feet, from which considerable ore was sold at $90 per ton. A tramway 460 feet in length reaches to the bottom of the hill, constructed of sawed timber. Like the Criterion, it was worked for gold, but will now be operated for the rich silver material it is known to contain.

The Ernest was developed the past season by about 100 feet of tunnel and shafts. The ore mills from 40 to 60 ounces in silver. It is owned by the Ernest Mining Company.

The Columbia, situated near the Ernest, has had no development the past season; the vein is from 2 to 8 feet, and the ore mills from $12 to $15 in gold and silver.

In *Mosquito district*, the principal mine is the London. The property is thoroughly developed, and all works have been well carried out from beginning to end. Very large ore-bodies are shown up, which carry gold; very rich samples are obtained. The ore is found in what appears to be a contact fissure vein between the lime and the granite; in some places the vein is of immense width. The mine is opened entirely by tunnels, levels, drifts, and connecting winzes, aggregating a total of 3,000 feet without including stope openings. The lowest depth attained from the surface is now 770 feet. The ore exposed in one stope is estimated at over 10,000 tons; five stopes, one above the other, 60 to 70 feet apart and several hundred feet in length, are already in shape to give employment to a large force of miners. The ore-body is massive and continuous, and of a value ranging from 3 to 4 ounces in gold, 6 to 12 ounces in silver, and 1 to 3 per cent. in copper. The chief work hitherto in the mine has been for development only, as from its situation, being high on the mountain, the cost of taking ore to mill has been excessive. The policy of the management has been to first prospect on a grand scale for mineral treasures, and then force production by the employment of the best appliances known to modern intelligent mining. To accomplish this the company is now building 7 miles and 1,000 feet of railway line to connect with the South Park Railroad, at the mouth of Mosquito Creek, and 200 feet east of the Platte River crossing, between Alma and Fairplay. The greater part is already completed. This road will reach to the foot of London Mountain, and connection made with the mine by wire tramway, over which all ore will be delivered to the station.

The Parnell mine is an adjoining property to the London, and is owned by the Parnell Mining Company. The mines were located about three years ago by Leadville parties, and a large amount of development work has since been prosecuted upon them. The first work was to drive a tunnel into the side of the mountain, and this has been driven 400 feet. It cut two large and distinct veins, but at too slight a depth. It was then decided to go deeper; so at the mouth of the tunnel a shaft was sunk 100 feet in depth, and from the bottom a level was run to cross-cut the veins. This level was extended 20 feet, when the first vein was reached. The ore-body shows quartz interspersed with iron, and carries both gold and silver in about equal value. Tests made of quantities show the value in both metals amounting to about $90 to a ton. It is proposed to continue the level till the second vein is also cut, when drifts will be extended along the line of each vein, and stoping will be begun. The first vein cut is at a depth of about 160 feet from the surface, and with the strength of the vein already exposed a drift along the line will leave thousands of tons of ore ready for stoping. There is every reason to believe that this mine will prove of great permanence and value.

The New York mine, west of the London, has been steadily at work. The amount of development is large, and an immense quantity of ore is in sight in the different workings. They are waiting for the completion of the railroad before making shipments.

The Iowa Gold and Silver Mining Company own two good claims at the head of Mosquito Gulch, between the London and New York mines. The mineral found in the North Star, the principal claim of the company, is the same as that of the New York, which has been a steady and profitable producer. The North Star has assayed from $30 to $160 in silver to the ton. The development consists of two tunnels, one of 10 and the other of 50 feet, a chamber 8 by 9 feet at the end of the 50-foot tunnel, and a shaft from the chamber of 20 feet. The vein, a fissure of decomposed quartz, is 5 feet in width.

The Sunny South is at the head of the gulch, near the London. It is developed by a tunnel which has been run in on a lode for a distance of 70 feet. At 65 feet an inch streak of ore was cut, which rapidly widened, and on sinking on it for a depth of 6 feet, the pay streak increased to 2 feet of ore. During the sinking 28 sacks of ore were taken out, which, on being tested at the London mine, the native silver being thrown out, yielded returns of 385 ounces in silver and 20 per cent. in lead. Since this test was made the ore has become exceedingly rich, yielding numerous fine specimens of wire and leaf silver.

The Lone Star, in the same vicinity, is the property of the Rocky Mountain Mine Developing Company, of which Wm. E. Johnson. of Cañon City, is the general manager. It has a 218-foot shaft and 350 feet of tunnels, drifts, and levels. The vein is a true fissure, 4 feet wide, with 18 inches of good pay, between granite walls. The ore is a sulphuret, and runs over 70 ounces silver per ton. Outside the pay streak the vein matter averages 35 to 40 ounces.

The Bonanza King is a recent discovery, located on the foot-hill of Buckskin Mountain, at the head of North Mosquito Gulch, and is regarded as a valuable property.

The Prince Oscar mine, located a short distance from the London, is being worked and shows good ore. The shaft is now down 30 feet, and in ore all the way. The property promises to develop into a good-paying mine.

The U. P. and K. P. has been actively operated. There is a vein of good ore, which is principally gold. Assays have returned from 2½ to 16 ounces in gold. There is from 5 to 6 feet of ore. The milling ore is treated on the ground and the smelting ore is shipped. The mill has 20 stamps and a Metcalf concentrator for the tailings.

The Boaz Mining Company own six claims on Loveland Mountain, south of the Fanny Barret; they are the Charles XII, Mountain Star, Centennial, Louisiana, Stella, and Legal Tender lodes.

The Charles XII lies parallel to and adjoining the Kansas lode, and west of the K. P. and U. P. mines. It is opened by three tunnels. The first or upper tunnel is 115 feet in length, exposing a body of mineral varying in thickness from 12 to 14 inches, and assaying from 100 to 700 ounces silver per ton, 1 to 2 ounces gold, and 30 per cent. lead. One of the mill runs gave 240 ounces of silver with about 20 per cent. lead. That the vein, a fissure, is widening and becoming richer with depth, is evident from the fact that when the tunnel was in 80 feet the vein was only 8 to 14 inches in width, and the mill runs then were about 112 ounces in silver per ton. Of the other two tunnels, one is in 30 and the other 45 feet. The ore vein shown by these tunnels is 2 feet in width, giving average assays of 100 to 150 ounces silver per ton and mill runs of $40 to $50 in silver and gold. When these last two tunnels are in to a depth of 700 feet they will cut the vein 400 feet below the surface.

The Mountain Star, directly west of the Kansas mine, has a 20 foot tunnel, showing a mineral streak of 2 feet, carrying galena and sulphurets. The mill runs on the Star have been from 50 to 100 ounces silver.

The Centennial joins the Mountain Star on the west, and has the same amount of development with the same character of mineral in sight.

The Louisiana lies a short distance above the old Orphan Boy. The development is a 30 foot tunnel, showing a 2 foot mineral vein.

The Little Stella, an extension of the Centennial on the north, joins the Fanny Barret properties. A 30-foot shaft on the Stella discloses a quartz formation of the same character as that which overlies the Fanny Barret mineral.

The work on these properties is successfully conducted by Mr. A. M. Danielson, the superintendent of the Boaz Mining Company.

The Hock Hocking mine is situated on Pennsylvania Mountain, south of Mosquito Gulch. The developments of this mine consist of a good shaft-house, over 200 feet of shafting, and between 300 and 400 feet of levels. The mineral body in the Hock Hocking is in a stratified formation similar to Mount Bross. A shaft was sunk 60 feet, where it cut a contact vein. From the bottom of this shaft three drifts were run, one to the northward, toward the Lone Star property. This drift encountered a lime horse, went through it and obtained a larger vein and better mineral than that found above. A second shaft was sunk on a perpendicular vein, about 2 feet in width, to a depth of 140 feet, cutting through two contact veins, the second being a fine vein, which they are being prevented from working at present on account of water. From this shaft they ran one drift about 60 feet on the fissure vein, down the hill, showing a true vein of mineral, but not of high grade, which will still pay by concentration or by some process for handling low-grade ore. The ore is a sulphuret that has given mill runs of over $100, and an average of over 150 assays shows $204 in silver. The vertical vein has a large showing of lead, and in the second contact considerable gold has been found. The facilities for treating ore are not adequate, and more attention has been paid to developing rather than producing.

The Weston is adjacent to the Hock Hocking, the workings on the latter being from 60 to 70 feet from those of the Weston. The Weston shaft was sunk to a depth of 80 feet. In this shaft they came upon a fissure vein 8 feet in width, with pay mineral from wall to wall, and next to the hanging wall the mineral runs as high as $300 to the ton. On this vein they have drifted 100 feet, without any stoping, only taking out and sacking the mineral removed from the drift. This drift has cut and exposed a 3-foot contact vein, increasing also down the hill and to the northward toward the Lone Star.

The Juniata, north of the Weston, is opened by a 400-foot tunnel. Near the end of the tunnel an upraise has been made of about 20 feet, which cut a 3-foot flat vein, which also dips toward the Lone Star and but a few yards from its westerly line.

The Lucky Queen adjoins the Hock Hocking; it is developed by two tunnels, one of about 60 feet and a lower or working tunnel of 75 feet. While running the tunnels about 40 tons of mineral has been taken out which has given assays from 60 to 350 ounces in silver to the ton, and a mill run gave $70. The mineral, a sulphuret, lies in a vertical vein of good size.

The Tennessee group comprises the Tennesse, the Tennessee No. 2, Davenport, Leadville, and Red Flag.

On the Tennessee is a 75-foot shaft that for 20 feet is in mineral assaying 60 to 120 ounces silver.

The Davenport and Tennessee No. 2 have about 30 feet of shafting each.

On the Leadville is a 20-foot shaft and an open cut showing gold.

The Red Flag has a shaft of 35 feet cutting the mineral vein near the bottom. But little more work is required to make these claims paying property.

The Cornucopia, owned by the Pine Tree Mining Company, is a true fissure vein, which is reached through the working tunnel at only 56 feet distant from its mouth. The ore is a decomposed quartzite formation that assays from 1 to 3 ounces in gold and some silver, and is free milling. The arrangement of the works is such that when ready the company can take out from 50 to 100 tons of ore per day, merely having to stope down from the discovery cut and tunnel to the working tunnel, thus saving the labor of raising the ore from a shaft.

In *Horse Shoe district* the McLean Mining Company own about 960 acres of mineral lands.

The Mudsill is one of their chief mines. It was located in 1880 by Messrs. Willey and Graham, and purchased by the McLean Company in the fall of 1881, since which time $40,000 worth of development work has been done. The developments consist at present of an incline of 150 to 160 feet in length, and three levels which terminate on this incline, in all over 1,200 feet of openings. The vein is 9 feet in depth, two-thirds of which is a chloride and sulphuret ore in a lime gangue averaging not less than 100 ounces silver per ton. The vein is between two clearly defined walls, one of gray and the other crystallized lime.

The Badger Boy runs from 40 to 75 ounces silver, with 40 per cent. lead.

The Last Chance has had millings of 50 to 65 ounces silver and a fair percentage of lead.

The Hopkins or old Grand View has ore whose mill runs show from 50 to 100 ounces in silver, with a large amount of lead.

The Widga, with a 4-foot ore vein, milling from 30 to 75 ounces, is owned by H. S. De Lamont.

The general character of the ores in the mines of the Horse Shoe district being a carbonate of lead, carrying from 25 to 100 ounces in silver, and an average of 50 per cent lead to the ton, renders them easily reduced, while in their immediate vicinity iron, limestone, and all else needed for fluxing are found in immense quantities.

The Sherwood, Emma, and Little Nell are worthy of mention.

In *Hall's Gulch district* in the northwestern part of the county are a number of mines which long since passed out of the list of prospects.

The Missouri is one of the prominent mines. The developments consist of shafts and about 500 feet of tunnels upon the vein. The fissure is 30 feet wide, as proven by a cross-cut run from the level when in about 240 feet. The ore streak is from 6 inches to 3 feet wide, and runs in bismuth, silver, gray copper, copper pyrites, and iron. The ore also carries gold, running from a trace up to 11¾ ounces. Mill runs at Argo gave from 150 ounces to 219 per ton, with six-tenths of an ounce in gold and 10 per cent. copper.

The Ypsilanti is worked by two tunnels, the first of which is in 300 feet, showing mineral most of the way averaging $110 to the ton; the second is in 300 feet on the lode, with a 100-foot cross-cut, and a pay streak of from 6 inches to 2 feet of gray copper, lead, wire silver and ruby silver, averaging $150 per ton. The property is owned by Col. J. B. Stone, of Denver.

The Great Eastern group comprises the Great Eastern, International, Anglo-Saxon, and the Kalamazoo, the first three being parallel lodes and the last a cross-vein.

The Great Eastern shaft is 115 feet deep, with 15 inches of continuous ore, carrying gray copper and bismuth. Two car loads shipped from this shaft milled from 100 to 250 ounces silver and from 20 to 30 per cent. copper. At 100 feet down the shaft a level has been run 90 feet on ore the entire distance.

The outcrop on the surface of the Kalamazoo is very wide, and the 43-foot shaft shows 20 inches of gray copper and bismuth, assaying as high as 960 ounces. The vein is 7 to 8 feet wide.

The International has a tunnel 180 feet, with 4 inches of galena and gray copper streak. This tunnel has cut the Kalamazoo vein, and will also intersect the Great Eastern at a depth of 250 feet from the surface.

The Anglo-Saxon has only assessment work performed.

The Teller Mountan tunnel cuts Teller Mountain nearly 1,000 feet from the apex, entering from Hall's Gulch on the eastern and terminating at Deer Creek on the western slope. In its course through the mountain many valuable mining claims are opened, some of which are already producing mines, as the Whale, Saint Louis, Crescent, Shark, Independent, Ready Pay, Cashier, and many others.

The Whale has about 2,000 feet of development on the vein in the four levels, with a pay streak from 8 inches to 2 feet in thickness and continuous. The ore is gray copper and galena, the first class milling 250 ounces in silver, and second class 100 ounces, with an average of over 30 per cent. in lead. At least 5,000 tons of fine concentrating ore are dumped at the mouths of the different levels.

The Cashier is now worked through its own tunnel from the Pacific slope, and the Ready Pay, belonging to the same company, by a cross-cut 60 feet long through the same outlet.

The placer mines of Park County have been profitably worked for many years.

The Tarryall and Fairplay mines have continued to be moderately productive.

The principal work done during the year was by the Alma Placer Company, which owns 640 acres of gravel opposite and below the town of Alma. The work is being carried on by a force of 22 men and two Little Giants having the patent deflector nozzle, one giving a 4-inch stream and the other a 6-inch. The banks are 60 feet high and giving a water pressure of 60 feet, very effective work is done. About 1,000 inches of water are used, and the giants force one-third of it against the banks. The sluices are 4 feet wide, with a 4-inch grade, and there are, with branches, about 3,000 feet of sluices, which are being added to daily. The ground shows a marked improvement over last year, and the large bowlders are handled by an immense derrick, operated by a hurdy wheel, with a capacity for lifting and swinging to place a 10-ton bowlder.

The production of the county in 1882 was $100,000 in gold and $250,000 in silver.

PITKIN COUNTY.

I am indebted to Mr. P. Lonergan, of Ashcroft, for the following information relative to this county and its mines:

Pitkin County, a northeastern portion of Gunnison County, cut off from the latter and organized in 1880, has within its boundaries three mining districts, Chipeta or Independence, now called Sparkill, Aspen, and Ashcroft, each having its own camp.

Independence or *Sparkill district*, situated in the eastern part of the county, contains a number of valuable mines, the principal of which are controlled by the Farwell Mining Company.

The general formation of the district is granite and the ores are composed of auriferous copper pyrites in a compact siliceous gangue, and average in value $16 per ton. In the other two districts the ore is principally argentiferous galena, averaging 70 ounces silver and 40 per cent. lead per ton.

The Farwell Company own some twelve claims, which have been extensively developed, and up to August, 1882, kept two stamp mills, of 15 and 30 stamps respectively, in constant operation, producing in the neighborhood of $125,000 in gold. Since that time the mills have remained idle either for want of a sufficient ore supply or for other reasons known only by the company. In the old workings on Independence or Ward Hill, on north side of gulch, little or no ore is left of a paying grade, and in most places the vein has pinched out to a mere crevice, or else is filled with barren gouge matter. The principal work is on the Mount Hope lodes, situated on south side of gulch. Developments are being made at three different places on vein here, and some of them are extending considerable promise. One of the principal shafts is down about 65 feet and shows 15 to 20 inches of pay ore.

The Champion mine, near the Farwell group, is spoken of as one of great value, opened by a tunnel running along the vein a distance of 320 feet. It has already produced some very fine ore. The last lot shipped, a lot of 9 tons, gave returns of $475. Besides this the tailings, after the run of the ore through a crude stamp mill, assayed 2½ ounces of silver to a ton. The ore also contains about 15 ounces of silver to a ton, none of which was saved. Other lots of ore from the mine have run much higher, one lot of 10 tons producing $1,760. With a good mill the mine will soon become largely productive.

The Black Bess mine, on the same vein as the Champion, has the same grade of ore and has made important developments, and is now ready to ship steadily as soon as they have milling facilities.

Aspen district is noted for its large veins of argentiferous galena, among the principal being the Smuggler, Spar, Morning and Evening Stars, Eva Bella, Camp Bird, Chloride, and Climax.

On the Smuggler work is steadily prosecuted. The main shaft is down over 100 feet and drifts are being run east and west. About 15 feet from the shaft in the western drift a fine vein of mineral was struck. The ore found is fine galena and quartz, running well in silver. Specimens taken from this drift show native silver. The whole breast of the drift is in mineral, and will probably prove a rich find, as it increases in both quantity and quality as the work progresses. The ore is of better quality than any before taken from the mine.

The Smuggler Mining Company are working three shifts on the Mollie Gibson. This mine has a shaft of 40 feet and a drift at the bottom of 70 feet.

The Spar is a valuable property, but like many others it has been in litigation, which retarded development, and care was not taken for an intelligent working of the property, but whenever and wherever rich mineral would be encountered, it was immediately extracted. The work now being done is not so much for the purpose of getting out ore as it is to put it in such a shape as to take from it 50 or 100 tons per day when there is a smelter to treat it.

One of the most valuable groups in the district is the Camp Bird, including also the Iowa Chief, Edison, Silver Star, Grand View, and Burro.

The Camp Bird is one of the oldest locations in the district. It is opened by a tunnel 200 feet long, which cuts the vein at a vertical depth of 150 feet. From this point an incline follows the dip of the vein 30 feet, and the drift follows the strike 120 feet. The vein is about 3 feet wide, the ore being decomposed spar, carrying silver and a small percentage of iron and lead. The first-class mineral is a dark brown ore showing chloride stains, numerous assays from which have given over 2,000 ounces to the ton, and a mill run gave 363 ounces to the ton. Following the streak of rich chloride mineral is a body of sand, resembling lead carbonates mixed with lime. This is a low-grade mineral (averaging, with careful mining, 15 ounces to the ton) that will some day pay well by concentration. The resemblance of the ore in this vein to that in the upper workings of the Spar mine leads to the conviction that they are one and the same vein, which is further confirmed by the fact that the walls and country-rock are the same in the two mines, viz, short gray lime below and black and gray hard lime above. They are also, as is well known, on the same ridge, and lie in a direct line with the Oakland No. 2 mine at the summit of the ridge. In the drift the vein is clearly defined on either side, without break, though varying in width from a few inches to 3½ feet, and is of the same general character as already described.

On the top of the ridge above the Camp Bird is the Oakland No. 2. Considerable work has been done upon this property and the vein has been exposed in a number of places. The ore shipped to Leadville for reduction yields about 150 ounces of silver to the ton.

The Eva Bella has made a steady though small production of ore. At the depth of 100 feet in the shaft drifts have been started. The vein is an unusually wide one.

The Hard Cash is an extension of the Eva Bella. Three tunnels have been started, in all of which mineral has been reached, and which altogether show 200 feet of development. A vein is shown of 3 feet, lying between limestone and sandstone. The pay streak of fine, rich-looking ore is 12 inches thick. It runs heavy in copper. Between 20 and 30 tons of good mineral have been piled on the dumps.

The New York mine, in Ophir Gulch, adjoins the Eva Bella; it has an incline of 50 feet, which shows a fine vein of gray copper and galena, assaying from 400 to 500 ounces. A shaft was started above the incline to cut the vein at a depth of 100 feet, but the ore was found at a depth of 90 feet, and shows even better than that met with in the incline. The miners report 6 feet of solid ore exposed, and the rich ore-body is estimated to be 4 feet thick, and will run 400 ounces.

The Colorado Central is in the same vicinity as the New York mine. It furnished ore in large quantity last season, but owing to many difficulties work was stopped, and it has lain idle for some time. The incline is in solid mineral for over 50 feet. The mineral is very similar to that in the New York lode, and it is probably on the same vein.

The Cæsar, also in Ophir Gulch, has a shaft 30 feet, from which a drift runs some 40 feet to the south; in both shaft and drift a large body of spar and lime, carrying bromides, chlorides, and gray copper, is exposed, assays of which give as high as 200 to 400 ounces. This property also has a 200-foot tunnel running east. A drift from this tunnel of 50 feet to the south will connect it with the shaft and will expose a large body of mineral.

On the Pioneer, on Aspen Mountain, a new tunnel was started running from the discovery shaft on the vein. They are also working on the upper shaft, and are down over 20 feet. Both places show fine galena. The developments have been carried on to such an extent that 15 to 20 tons of ore can be extracted daily, and that amount will be mined when the smelter needs it.

The Mother Shipton is situated to the south and east of the Pioneer, and has a vein of mineral 7 feet wide. The discovery shaft is 30 feet in depth directly on the vein. The mineral is steel-gray galena and spar, mixed with sulphurets, and mill-runs over 100 ounces silver and 40 per cent. lead to the ton.

The Mountain Ranger's development consists of a tunnel of 155 feet; drift on vein of 10 feet; shaft, of 65 feet. The mineral assays 32 ounces silver and 43 per cent. lead, and carries large quantities of fluxing iron. This mine is ready to ship to smelter.

The mines of Aspen, taken as a whole, show but inconsiderable development, and owing to a lack of machinery the production of lead and silver has been confined to the small shipments of ore to Leadville, 53 miles distant, which amounted in the aggregate to about $50,000. A 60-ton smelter is in process of construction for the treatment of the ores of this district and is expected to be in operation by the middle of January, 1883.

Ashcroft or *Columbia district*, the most extensive in its fissure veins of high-grade galena, gray copper, and silver glance ores, forms the southern boundary of Pitkin County and joins Gunnison on the north. The formation is Silurian lime, granite, and Carboniferous sandstone. Among the principal mines known up to this date are the Montezuma, Tam O'Shanter, Wichita, Gray Eagle, Yellow Boy, North Star, Michigan, Highland Chief, Eureka of the Paradox group; Alcyon, Pearl, Minneapolis, Cummings, Osborn, Unexpected, Rain Storm, Champion, and Boulder City, of which the Montezuma, on Slate Mountain, owing to its developments and peculiar character of ore, is acknowledged the best. On this mine some 650 feet of development work has been done in the shape of shafts, drifts, and tunnels, 450 feet of which is a cross-cut tunnel calculated to cut the vein some 400 feet from the surface. A shaft of 125 feet between the walls is turning out from 15 to 25 tons of high-grade galena and sulphuret ores daily, which, from shipments made in 1881 to outside points, indicates a character capable of milling from two hundred to three hundred ounces silver to the ton.

The Tam O'Shanter and several other claims, including the Yellow Boy, are similar in character, but with less development.

On Slate Mountain is the Silver Islet group, northeast from the Tam O'Shanter. It comprises the Silver Islet, Silver Wave, Alpine, and Minnesota. The developments on the Silver Islet are on two well-defined fissure veins 3 feet in width, with a pay streak nearly 18 inches wide. The ore is white quartz, carrying sulphurets, gelena, and gray copper; mill runs have been made from ore taken out at a depth of 18 feet which gave returns of 70 ounces of silver per ton.

The Silver Wave is a vein running parallel to the Silver Islet, 5 feet wide, with pay streak of nearly 12 inches. The ore is quartz, carrying galena, and assays 50 ounces of silver and 60 per cent. lead per ton.

The Alpine is the most remarkable claim of the group. The vein is from 4 to 30 feet in width, and is easily traced the full length of the claim. The development being made is by tunnel going through an iron cap rock. The ore is quartz, carrying sulphurets and galena, and runs 30 ounces silver and 70 per cent. lead to the ton.

The Minneapolis is an extension of the Alpine, similar in character throughout. All of the veins of these claims are true fissures, well defined and in granite formation.

The Michigan is an adjacent claim to the Silver Islet group. An assay of picked specimens gave return of 1,519 ounces in silver and 30 ounces in gold. The vein is of quartz, 4 feet wide, and carries black sulphurets, gray copper, chlorides, and galena. The pay streak is 26 inches wide.

The Sedalia group is on the south slope of Slate Mountain, a mile from the Montezuma mine of the Tam O'Shanter group. The mines composing this group are the Sedalia, Burton, Elizabeth, Sydney Johnston, and Gracie. The veins are true fissures running northeast and southwest and dip to the west.

The Sedalia is being worked by a tunnel running in directly on the vein, and is 185 feet in depth. The vein is 3 feet in width from wall to wall, the ore quartz carrying brittle silver.

The development on the Burton is by shaft 85 feet in depth. The ore is gray copper, chloride, and galena, and assays 34 ounces silver and 2½ ounces gold per ton.

On the Elizabeth and Sydney Johnston but little work has been done beyond the assessment.

The Gracie is a new discovery and promises to be a mine of great value. The ore is quartz and spar, with a good showing of galena.

The Small Hopes claim is an extension of the Sedalia. Two shafts have been sunk on the vein, one 13 and the other 62 feet in depth. This is a 3-foot vein, with a pay streak nearly 12 inches in width, the ore gray copper, showing wire silver.

On the Hidden Treasure the shaft is down 110 feet, and the vein is 4 feet wide, with a pay streak of 6 inches. The ore zincblende and silver glance. The lowest assay taken from the pay streak was 348 ounces silver.

The Little Emma lode, near Ashcroft, on Pine Creek, has a vein over 5 feet in width, from which assays gave 25 ounces gold, 126 ounces silver, and 18 per cent. lead. The tunnel is in over 70 feet.

The Rainstorm group, in Traveller's Basin, comprises the Rainstorm, Tibbetts, Castle Queen, Jay Gould, and May Queen mines. The three first named run northeast and southwest, the other two claims running east and west. The principal development has been done on the Tibbetts and Rainstorm. The veins on these claims are well defined between granite wall rocks, and can be traced the whole length of the claims.

The Tibbetts has a tunnel 150 feet into the mountain following the vein. The ore is white quartz, carrying gray copper and brittle silver. There is no difference in the character of the ore in any of these claims, and they only need a systematic course of development to have them prove up valuable properties.

The Little Emma is an extension of the Rainstorm. The development is by tunnel, the width of vein about 3 feet, with pay streak 6 inches wide. The ore is white quartz, carrying heavy quantities of gray copper with brittle silver. In the vicinity of these claims and on the same veins are other properties, which, although but prospects, give good showing on the surface, among them being the Morning Star, Flowery Boy, Wilkesbarre Star, and Eagle Nest.

The Morning Star has a vein 4 feet wide, prospected by a 25-foot tunnel. The ore carries gray copper, brittle silver, and silver glance. On the range, or rather a spur of mountain between the Rainstorm group and the Slate Mountain, lie the Panther, Eureka, and Robin Hood claims, belonging to J. B. Brooks & Co. These claims are remarkably good mines for the amount of development, the veins being between lime and granite formation. The ore of the Panther is spar and galena, and assays 40 ounces silver and 60 per cent. lead to the ton.

The veins in this district are from 2 to 15 feet between walls, and in many cases carrying a very high-grade ore, which is being laid on the various dumps to await the necessary machinery, as there are no smelters in operation up to this time. Two small smelters are being built, however, one of which (the Brooks and Bethune) is expected to blow in about March 1, 1883.

The production of the county in 1882 was $90,000 in gold and $30,000 in silver.

RIO GRANDE COUNTY.

Rio Grande County, in Southern Colorado, lies south of Saguache and east of Hinsdale Counties. A large portion of its area is included in the San Luis Park. The mining section is in the southwestern part of the county, and is comprised in *Summit district*. The mines of this district are famous for the size and extent of the veins, for their uniform and large production, and for the extraordinarily rich pockets of ore found.

The Ida mine is one of the first discoveries of the district as well as one of the largest producers. The ore is honeycombed quartz, heavily impregnated with iron oxide, and carrying free gold in quantities ranging from $500 to $250,000 per ton. Owing to the reluctance of the management to furnish information it is impossible to give an extended description of this rich property. The company is running two stamp mills, one called the San Juan, owned by the company, and the other the Odin, working on ore from the Ida mine.

The Little Annie was also an early discovered mine, and for a time was considered to be the most valuable in the district. The principal owners are Jonas H. French, Johnson Livingstone, Col. L. W. Winchester, L. A. Winchester, M. W. Cooper, L. Hoyt, Crooke Bros., and M. Jessop.

A 10-stamp mill was run continuously during the latter part of the year, and a 40-stamp mill will be erected during 1883. Recently the Golden Queen mill has been leased, and is now being put in repair for use by this company.

The Golden Queen was located shortly after the Little Annie, and is one of the best known mines in the camp. The principal owners are John Wingate, Alva Adams, Arthur Burton, A. A. Grant, John A. McDonald, Peter Beck, and O. P. Posey. Owing to an entanglement of the affairs of this company it remained idle during the year.

On the Aztec mine steady development has been made, and the ore taken out has paid for the work from the beginning. This company has shipped all the ore to the smelting works at Pueblo, and the mine has paid large dividends.

The Golconda comprises the Golconda, Game Cock, Boss, Len, Nick, and Tunnel, situated on South Mountain. When they are systematically developed they will become mines of prominence.

The Iowa and Colorado Consolidated Company's property is of the best character. The following description of the very complete mill of this company is from the San Juan Prospector:

"The entrance to the mill is through the engine-room. Here are two large boilers and two 50-horse-power engines, which furnish the power to drive the vast and complicated machinery. In the rear of the boilers is placed a No. 5 Knowles plunger pump, which furnishes the water for the boilers and batteries and for fire protection.

"On the central floor are located the stamps, fifty in number, twenty of which are 650 pounds in weight, ten 700 pounds, and ten 850 pounds. In front of the batteries are eight tables, each having two silver plates, and in the rear are eight Tullup automatic feeders which supply the batteries with ore from the ore-bins.

"The floor below is largely fitted up as a silver mill, being the only mill of this character in this district. Its object is to save the silver, with which much of the Summit ore is impregnated.

"There are here four grinding-pans and two immense settlers; also three 'Bee Jigs' for concentrating purposes. These jigs will concentrate fifteen tons of tailings into one, and the concentrations will be shipped to a smelter. Alongside of the grinding-pan is a clean-up funnel, into which the amalgam is placed as it comes from the plates. Above the stamp floor is the ore-bin which has a capacity of 300 tons; and above the ore-bin is the Iowa tunnel and the tramway. The tramway is 3,665 feet in length, and is supported by 36 trusses, having its upper limit at the mouth of the Iowa tunnel. It has 84 buckets, which carry 100 pounds of ore at a trip, and its capacity is 150 to 200 tons of ore per day. The ore will be crushed at the mine by a Blake crusher, which has a crushing capacity of 150 tons per day. The power to drive the crusher and also to ventilate the mine is furnished by a 25 horse-power engine. It will be seen that the ore is crushed at the mine and carried direct to the stamps by power, thus saving all handling or moving. It fact it has been the design in constructing this mill to do it in such a manner as to save by automatic power all the manual labor possible, thus saving expense. Near the mill is a retort-house, 24 by 40, in which is located the assaying department of the company. Here also is located a small smelting furnace, constructed for testing the ores of the company's mines.

"There has also been erected a warehouse, which is well filled with supplies for the mine and mill; also a large boarding-house for the men, and small building of less note for other purposes."

In 1882, Rio Grande County produced approximately $210,000 in gold and $20,000 in silver.

SAGUACHE COUNTY.

This county, situated in Southern Colorado, west of the Sangre de Cristo range of mountains, comprises a portion of the San Luis Park, bounded on the west by the Cochetopa range.

Kerber Creek district is in the northern part of the county, the town of Bonanza being the chief business and supply point. The district extends from the base of the Sangre de Cristo range along the Saguache range in a southwesterly direction for the distance of 20 miles, with a width from 5 to 10 miles. The formation is porphyry, with a granite contact on the north and east, and lime on the south.

On Little Kerber Creek is the Columbia mine, discovered in the latter part of 1881. The vein, between walls, is over 7 feet, with a pay streak of 4 feet wide. Next to the walls is a 28-inch streak of clay, which carries from $20 to $40 in gold, and is free milling. Next to the clay is 28 inches of quartz, which has milled $2\frac{6}{10}$ ounces of gold and 230 ounces in silver at the Argo works in Denver.

It is opened by a shaft with 2 levels, one at 70 feet and the other at 150 feet. A 20 horse-power engine and hoist is over the shaft, and work is being pursued in a systematic manner.

In Stowe's Gulch, across the divide, are the U. S., India, and John A. Logan.

The U. S. and India are on the same vein and belong to a Philadelphia company. The dip of the vein is at an angle of 40°, and the working shaft is situated below the apex of the vein and sunk with the intention of cutting the vein at the depth of 160 feet. At 80 feet a cross-cut was run for the purpose of exploring the vein, and at the point in the cross-cut at which the vein was disclosed, drifts were run in each direction on the mineral. The southeast drift has penetrated on the U. S. ground the distance of 120 feet, showing a strong vein of gold and silver quartz, with a pay streak 12 feet wide. The walls are syenite

The John A. Logan is opposite the U. S. It is worked by a shaft 92 feet deep, showing large bodies of high-grade ore. A tunnel which is being driven on the vein shows a lode 12 feet wide; the mineral carries sulphide and bromide of silver, and assays from 30 ounces to 1,500 per ton. Eighteen men are employed, and the ore is sacked and shipped as rapidly as taken out.

In Enterprise Gulch, below Hayden's Peak, is the Albert. The shaft is 73 feet deep; the width between walls, 3½ feet. Two pay streaks are exposed, one of 7 inches on the foot and the other 5 inches upon the hanging wall. The ore consists of iron and copper pyrites, with brittle silver; assays run from 67 to 218 ounces per ton. The clay gouge with which the rest of the vein is filled has a value of about $17 per ton.

The Robert E. Lee, on Nil Desperandum Ridge, is reported to show a 3-foot vein, with 20 inches of pay and several tons of good ore on the dump.

Work is being pushed on the Goldbug lode. A strike of an 18-inch vein of quartz, assaying 193 ounces in silver and 18.10 ounces in gold, is reported at a depth of 45 feet.

At Bonanza is the property of the Mineral Hill Company. The chief mines are the Paris, Horace, and Empire.

The Paris has a shaft down about 100 feet, and has produced quite a body of good-grade galena ore.

The Horace is also a galena mine. It has a tunnel over 50 feet, and shows a breast of 24 inches good pay ore, but the mine is lying idle.

The Empire, situated on the southwest side of the town, has a large body of hematite exposed, and has produced most all of the iron at the smelter. This property so far has paid for its development, which is quite extensive.

Near the Camp of Exchequer is the Exchequer mine, a true fissure vein from 25 to 30 feet in width, with from 3 to 10 feet of pay. The ore, as milled, has run from 40 to 60 ounces of silver to the ton. The mine is opened by an incline, and a tunnel has been projected to cut the lode at a depth of several hundred feet.

North of the Exchequer is the Bonanza, which has been idle for some time. The ore-body, consisting of galena and copper, is very large, though of but low grade.

The Revenue is southwest from the Bonanza. This mine was idle for a considerable time, but work was recommenced during the year and confined strictly to sinking the main shaft and drifting in the first level, which was started at a depth of 72 feet. Twenty feet in depth has been gained since work was commenced, and the vein shows considerable improvement. It is becoming more closely confined, and the ore is not so much scattered through talcose gangue. The drift has reached a depth of about 25 feet, and some very good ore has been taken out. The vein at the bottom of the shaft is about 16 feet wide. The ore is galena and gray copper, assaying 53 per cent. in lead and 10 per cent. in copper. It assays from 160 to 490 ounces of silver per ton.

The Arkansas, below the Revenue and near the town of Exchequer, is developed by a tunnel 175 feet long, from which a shaft has been sunk 75 feet, and a level run from the shaft for 25 feet. The vein is 7 feet wide, with a pay streak of galena and gray copper 26 inches in width, assaying 75 ounces of silver per ton.

In Rawley Gulch is the Keystone, which is opened by a shaft for about 70 feet. The ore is a good grade of galena, but, in consequence of litigation, work was suspended.

The Rawley has been opened extensively for the distance of 400 feet by tunnels, shafts, and cross-cuts, exposing large bodies of galena and gray copper ore, which run from 30 to 500 ounces in silver. The development is made in a systematic manner and with a view to a large and steady output of ore.

The Townsend, below the Rawley, has a shaft down 20 feet, and a tunnel 150 feet run in to cut the vein. It has milled three car loads of ore, which runs 60 ounces in silver and from 5 to 15 per cent. copper. The ore is quartz highly impregnated with copper, and is taken out of the shaft in bowlders weighing from 600 to 700 pounds.

On the divide between Rawley and Squirrel Gulches is the Cora. The shaft is down 100 feet, showing a good-sized body of gray copper, but for want of funds to prosecute developments the mine is lying idle.

The Antero is developed by four shafts, all of which show a large quantity of ore. The first shaft is down about 60 feet, the second shaft is about 25 feet, the third and fourth are 20 feet each. Work is being prosecuted on the first shaft, and considerable ore is being taken out. The character of the mineral in the lode is pyrites, gray copper, and chlorides. The walls, which are porphyry, are highly impregnated with native silver, and large pockets of it have been found that will mill over 300 ounces of silver per ton. Shaft, ore, and boarding houses are already erected at the mine, and preparations are made to work the property all winter. About 15 tons of ore are in the ore-house.

At the head of Hamilton Gulch is a group of mines, consisting of the Little Jennie, Gipsey Queen, Sostenus, Kearsarge, Monitor No. 4, and the Merrimac.

The Little Jennie is opened by a shaft from which some high-grade ore has been extracted. In driving a tunnel 200 feet below the workings on the Jennie in order to cut the vein, a blind lode was encountered with a pay streak about 18 inches wide, composed of quartz, impregnated with gray copper and copper pyrites, with some galena. This rapidly widened out to about 6 feet. The ore is not of high grade, but there is a large quantity of it.

The Monitor No. 4 tunnel, at a depth of 83 feet, also cut a blind vein of about 8 inches of pay.

On the Kearsarge a tunnel has been driven 170 feet, with a good showing of mineral.

The Gipsey Queen is also opened by a tunnel of 103 feet. The lode is over 6 feet between walls, with a pay streak of from 7 to 10 inches. Some of the finest high-grade gray copper that has ever been found in this camp has been taken out of this mine.

The Merrimac is below the Gipsey Queen. The mine was badly opened, but considerable work was done in straightening up and retimbering the workings. The lode, at a point where it was cut by the tunnel, is about 14 feet wide, and is strongly impregnated with galena and gray copper. Mill tests gave from 40 to 175 ounces silver per ton.

The Payson group, in Hamilton Gulch, above the Little Jennie, comprised the Payson, Brighton, Newton, and Francis.

The Payson has been opened in five places. The main working shaft is down 100 feet, showing a large body of good mineral. The developments on the other claims are not so extensive, but they have commenced a tunnel on the Francis, which, when completed, will be 800 feet long, cutting all the lodes of this group at a great depth.

The Camp Bird mine, in the same vicinity, was opened to a depth of 80 feet, but water coming in rapidly the owners were obliged to temporarily suspend operations, not having machinery of sufficient capacity to handle it.

The Radcliffe is situated northeast from the Payson group. This mine is opened to the depth of 65 feet, from which point drifting was commenced near the surface. The pay streak was large and assayed as high as 260 ounces, but as depth was gained the mineral became poor in quality and continued so until within a few feet of the present depth, when it improved, and now gives a mill run, on 4 feet of solid ore, from 30 ounces up to 150 ounces silver and 20 per cent. of copper. Like many other mines in its vicinity, the Radcliffe suffers from a heavy flow of water, and in consequence remained idle for a portion of the year, but work was subsequently resumed, the ore and shaft houses were put in repair, and a whip erected for hoisting water out of the shaft.

The Mount Jay, near the Radcliffe, is another fine property, but is not in operation on account of water.

The Shawmut, Carrie, Eugene, and Four Per cent are situated at the base of Round Mountain. These claims all have well-defined true fissure veins, and have produced more or less good milling ore.

The Peoria is opened by a shaft 70 feet in depth. The lode is some 6 feet between walls, having a good-sized pay streak, consisting of galena, carrying chlorides that have assayed as high as 13,000 ounces. Work is being prosecuted continuously on this lode.

The Little Elva is situated at the head of Bear Gulch. A tunnel was run into the hill a distance of 170 feet, which cut the vein at a depth of 80 feet from the surface. At a point where the lode was encountered the vein was found to be pitching to the east, consequently an incline is being run on the vein at the breast of the tunnel. The lode is now over 6 feet between walls, showing a pay streak from 10 to 20 inches wide, growing larger as depth is gained. The mineral in the pay streak is quartz, strongly impregnated with brittle silver, gray copper, and sulphurets, assaying as high as 600 ounces.

On the opposite side of Round Mountain, at the head of Alder Gulch, are situated a number of fine prospects, of which the Belle of Colorado is the principal. Near the surface the ore was galena, but as depth was attained the mineral gave out, and nothing was uncovered until the shaft was down about 80 feet, when the vein was again found, and at the bottom of the shaft, 90 feet in depth, nearly 3 feet of mineral is exposed. The large percentage of gray copper which the ore carries in the lower workings renders it of a much higher grade than that encountered nearer the surface.

The Manitou group is lower down the gulch and on the divide between Alder and Rawley Gulches. A tunnel is being driven into the divide, that when completed will be over 800 feet in length, and will have cut the various veins of the group at a depth of from 250 to 800 feet. This tunnel is now in 265 feet. It has been driven by the aid of an air-compressor, that is run by a 30 horse-power engine situated about 200 feet down the hill from the mouth of the tunnel. Developments are progressing finely, and all the surroundings indicate practical work.

The Ajax claim, just west of the Manitou group, has run into a large vein at the depth of 30 feet, which is equal in size to any in the camp, and is pronounced very rich. The shaft is being timbered. The vein was at first discovered on the surface in four places, and upon sinking has consolidated into one. Only two men are at work on the claim at present, but a larger force will be put on if expedient.

Across the divide from the Manitou group and in Rawley Gulch are the Michigan and Othello, which have large veins of carbonate of lead running from 30 to 50 ounces of silver to the ton, and 40 to 50 per cent. of lead.

The Eureka and Paragon in the same gulch are opened by a tunnel run into the hill at the junction of the end lines of the two claims. The vein at the point where it was encountered is over 20 feet between walls, showing quartz, impregnated with copper pyrites, galena, and gray copper. The owners of the Paragon are drifting on their vein, and the indications are quite flattering.

The Whale, Lawrence, Crœsus, Superior, and Pacific mines are situated on the opposite side of the gulch.

The Whale has been a large producer of ore. The shaft is down 100 feet and drifts run in both directions. The south drift is in 35 feet, and the north 45 feet, and in this drift the mineral streak shows a body of ore 5 feet in width that has milled 149 ounces silver and 10 per cent. copper. A tunnel is being run that when completed will cut the vein at a depth of 250 feet.

The Lawrence is a southern extension of the Whale. The shaft, which is down over 100 feet, is located near the south end line of the Whale. and 200 feet south of the latter's shaft. The vein is large and well defined, and the ore-body very similar to that encountered in the Whale.

The Crœsus is situated below the Lawrence, but is idle from an overflow of water. The vein is large and well defined, the pay streak carrying antimonial and brittle silver, besides high-grade galena. As soon as preparations are completed for handling the water, work will be resumed.

The Superior, Pacific, Atlantic, and Erie form a group of claims of good promise.

The Superior has a shaft down 100 feet, with one short drift, and from the surface to the present depth it has shown a vein of over 7 feet, mineralized throughout with over 3 feet mineral on the foot wall. A quantity of galena and copper ore has been taken out of this mine and milled at the Bonanza smelter, which netted fair profit. The other claims of this group have not been as extensively developed.

On the divide between Rawley and Copper Gulches are the Minnie Lee, Sour Mash, Last Chance, Rosa Lee, San Joaquin, Jim Walker, and Stem Winder.

The Last Chance and Rosa Lee are valuable claims, but the owners have not sufficient means to continue their development in a systematic manner.

The Jim Walker is developed by a shaft down 80 feet, showing a strong vein of galena that has milled 50 ounces silver and 50 per cent. lead, besides some copper.

The Stem Winder lies east of the Jim Walker, and is the most extensively developed claim in that locality; shaft is down 100 feet, showing a large, well-defined vein and an average of 10 inches of galena and copper from the surface down, which mills from 30 to 120 ounces of silver per ton.

On Copper Creek are the Rover, Nine Bark, General Custer, McClellan, Ike Cook, Little Bee, and Willow Run.

The Rover has a shaft which is down 60 feet, and at the creek the owners are driving a tunnel on a lode which is supposed to be a spur of the main vein. The tunnel is in about 100 feet, and will have to be run 50 feet yet before the main lode is cut at the points of intersection. The mineral streak in this tunnel is 10 inches wide, and runs on an average over 60 ounces. The mineral taken from the shaft is galena and copper, and runs from 50 to 175 ounces per ton.

The Nine Bark is located above the Rover, and has a working shaft down to the depth of 70 feet. The vein is strong, being over 7 feet wide, quartz and mineral throughout. The mineral is galena and antimonial silver. Assays have been made as high as 8 ounces in gold and 365 in silver, but the general grade of the ore so far is from 18 to 40 ounces. A tunnel has been run on the vein 180 feet, showing a large vein with good mineral.

Generals Custer and McClellan are both fine prospects, situated above the Nine Bark.

The Illinois has a tunnel 140 feet long and a shaft 30 feet deep, and shows an 8-inch pay streak, comprised of quartz, gray copper, and copper pyrites, assaying from 40 up to 1,200 ounces of silver per ton.

The Hortense is opposite the Illinois, and on the other side of the gulch, and is supposed to be an extension of the Empress Josephine. The shaft is down 100 feet, and drifts at the bottom 30 feet long. The pay streak is over 2 feet in width. The ore for the distance of 80 feet ran low, but just before reaching the last level a body of gray copper was encountered that mills from 45 up to 3,500 ounces of silver per ton.

The Empress Josephine is one of the most valuable properties in the county. It is opened by a shaft of 210 feet in depth and three levels. The first level is now in 200 feet, and is in a solid body of high-grade ore that will bear shipping without sorting. The second level is in 160 feet, also in high-grade ore. The third level is in 60 feet, and in the same grade and character of ore as that found in the other workings. Work is progressing in each of the levels, but has been suspended for the present in the shaft. Some of the richest ore yet encountered has been taken out of the 140-foot level, 100 feet east from the shaft. The ore in this level has shown a steady improvement, the streak on the foot wall varying from 16 to 18 inches, consisting of galena of a high grade, with a 2-inch streak of antimonial silver on the hanging wall. Recently a marked change took place in the foot-wall streak, gray copper coming in with a 2-inch streak of silver glance, carrying native gold which runs 36 ounces in gold and 22,000 ounces in silver per ton. With the aid of a steam hoister and a good concentrator at the creek near the dump for the purpose of dressing the immense bodies of low-grade ore that comes out in the gangue, the mine by practical and systematic development would become one of the most constant producers of high and low grade mineral.

The Boss Mammoth is an extension of the Josephine, and has a shaft down about 80 feet, which is connected by a 20-foot drift with the Josephine shaft. The ore in this drift is about 24 inches wide, of the same character as the Josephine. It is expected that the Boss Mammoth will be developed through the Empress Josephine shaft, drifts being run from the 140-foot level and 200 feet stations to the west. The drift at 80 feet will be extended to a distance of 150 feet west, when a shaft will be sunk to the terminus.

The Last Resort is situated in the Ford Creek district. The shaft has attained a distance of 110 feet. It has a vein of nearly 8 feet in width, a seam of brittle silver and gray copper for a pay streak. Native silver is also found in small quantities in the ore. A cross-cut is in a distance of 20 feet. Both walls have been found, and the vein, although narrowing somewhat, is improving in quality. Assays have been obtained from the vein that have run as high as 3,000 ounces of silver per ton. The owners expect to put machinery on the property and push developments systematically.

The production in 1882 I have estimated at $10,000 in gold and $100,000 in silver.

SAN JUAN COUNTY.

All of the southwestern corner of Colorado was formerly known a the San Juan country, but it was subsequently divided into the counties of Ouray, Dolores, La Plata, San Juan, and Hinsdale. Of these, San Juan, situated in the heart of this region, is the smallest, and is surrounded upon all sides by high ranges of mountains, inclosing a high plateau or park, on which Silverton, the chief town of the county, is located. Mr. Oliver Mathews, of Silverton, to whom I am indebted for much of the information embodied in the following review of the mines of the county, reports an increase in the production during the year over that of 1881 of nearly half a million dollars. This large increase was due to the completion of the Denver and Rio Grande Railroad to Silverton, in July last, and a consequent large increase of shipments of ore. A considerable amount of ore had accumulated in the hands of buyers during the latter part of 1881, and was forwarded to market after the railroad was finished; the proceeds of this ore are not included, however, in the increased yield of the county for the year.

The ores of San Juan County are treated at other localities exclusively. A considerable amount has been shipped to the smelters at Durango, but the larger portion has gone to Pueblo and Saint Louis, while smaller amounts were sent to Omaha and Denver. The only reduction plant in the county is at Silverton. During the year the Martha Rose Mining and Smelting Company erected works of 20 tons capacity and provided with excellent facilities for handling and treating the ores. After a short and unsuccessful run the works closed down and passed into the hands of a receiver. The difficulty did not appear to be so much with the process as with the management. It is extremely doubtful whether smelting will ever be successful in San Juan. The larger works being located nearer to supplies of fuel and to cheap labor, will make the future of the small establishments in this county very perilous.

The reduction of the cost of shipping ores from $35 or $40 per ton to $12, which was effected upon the completion of the railroad, has given a wonderful impetus to mining in this county. Many ores heretofore unavailable have been moved with profit, and mines which were almost unheard of have become constant producers.

The result of bringing lower grade ores into the market has been to very materially increase the ratio of lead in the total product, which indicates that the bulk of the low-grade ores are silver-bearing galena.

The developments of the year have added strength to the theory that the ore-bodies extend to a great depth, and that true fissure veins are the rule. Although late in the year, discoveries of copper ore occurring in irregular masses in porphyry would seem to indicate that ore-bodies may be found outside of the walls of fissure veins. A large portion of the formation of the country is of igneous origin, though in the extreme southern part of the county stratified rocks can be found.

In the immediate vicinity of Silverton there are a number of mines of more or less prominence, most of which are shipping ore.

The North Star No. 1, which is situated on the north side of Sultan Mountain, is the property of the Sultan Mountain Mining Company. This mine was located in 1876, and has been steadily and successfully worked ever since. It is developed by a cross-cut tunnel of 525 feet, from which a lower drift is run on the vein 300 feet, this being the lower or No. 3 drift. Two other drifts on vein known as Nos. 1 and 2, the upper and middle, are 650 and 750 feet. Drifts Nos. 1 and 2 are connected by four winzes of 35 feet each, from which considerable ore has been stoped. Above drift No. 1 three raises of 50 feet each have produced ore in good quantities. Between Nos. 2 and 3 drifts are two winzes of 120 feet each on the vein, which dips slightly, the perpendicular between the two drifts being 110 feet. The vein averages throughout 8 feet in width, with a pay ore-body of 2 to 36 inches, the average being 12 to 14. All the ore taken out averages 70 to 80 ounces of silver per ton, and 35 per cent. lead, though with the usual sorting a grade double that is readily obtained. The ore which pays is galena, but considerable gray copper of a very high grade is taken from the mine. All the ore is shipped in car-load lots to Saint Louis. The mine has produced over 100,000 ounces of silver and 1,500,000 pounds of lead. It is a true fissure vein producing considerable water, which is unusual for that country.

The North Star No. 2 adjoins the North Star No. 1, and is worked through the same cross-cut tunnel which enters the latter, both companies owning the tunnel. In addition to this the further development consists of a drift on vein of 400 feet, from which are four raises, one to surface of 120 feet, others of 50 feet each. From all the raises but a small amount of stoping has as yet been done. The ore is similar in all respects to that of Star No. 1, except, perhaps, the average shows a little higher grade. It is the property of the Silverton Mining Company of New York.

The Belcher mine is on the same mountain and near the timber line. It has passed into the hands of an English company, who are driving a cross-cut to tap the vein 250 feet below the old workings. The ore is galena, free from refractory gangue. The mine has been a constant producer and paid its former owner handsomely.

The Avalanche is a southeastern extension of the Belcher, and though but little developed gives promise of being an equally valuable mine.

The Empire is an eastern extension of the North Star, and is a well-defined vein, carrying gray copper in paying quantities. It is developed by a 125-foot shaft and a cross-cut. The pay streak is about 18 inches in width and appears to be continuous through all the workings; it averages 100 ounces of silver and 10 per cent. of copper.

In the Ajax-Victoria group, situated at the base of Sultan Mountain, the owners have a good property which they are systematically developing. During the year two cross-cuts have been run and some drifting done which has exposed large bodies of low-grade galena, none of which has been shipped.

The Cleveland Consolidated Mining Company own a group of mines on the southwest side of Sultan Mountain, about 3 miles from Silverton. There are six claims in the group: The Little Bertha, Egipsey, and Cumberland, all three on one vein; the Cleveland and Alabama on separate veins are held by United States patents. The remaining property of the group, the Kingsley, a new location, not yet patented.

The development on the group consists of a 450-foot cross-cut tunnel which will cut the vein at 900 feet. Above this tunnel some 800 feet is another of 160 feet, which cuts Little Bertha vein. From the end of the last cross-cut 500 to 600 feet of drifts have been run between 200 and 300 feet each way. A tunnel of 75 feet above these levels is connected with them by a winze of 35 feet, from which, right and left, high-grade ore is being stoped. A shaft of 35 feet on the Bertha and one now started on the Cleveland to follow vein down to point where lower cross-cut will reach vein constitute the remainder of the development.

The vein of the Little Bertha, Egipsey, and Cumberland, or main vein of the group, is traceable on the surface for 3 miles, other companies and individuals holding the ground not covered by these three claims. This vein is 5 to 12 feet in width, with a pay streak of 5 to 15 inches of gray copper and galena, carrying both native and ruby silver. The gangue is lime, which can be worked at minimum cost.

The Cleveland vein, which crosses the other at an angle of 15 degrees, is also traceable on the surface for a distance of 2 miles or more, and in point of size, and character and grade of ore is very similar to the other or main vein. The winze which connects the two upper levels is at the point where the veins cross each other. The vein of the Alabama was cut in the 500-foot cross-cut when in 400 feet. At point where cut, about 350 feet below the surface fine, gray copper and galena ore was found, but was not gathered into a compact ore-body but disseminated throughout the vein, which is about 5½ feet wide.

The Kingsley covers a vein discovered in the long cross-cut. A main tunnel is being run to cut the veins at a depth of 800 or 900 feet. Four veins have already been cut.

On Hazelton Mountain, about 3 miles northeast of Silverton, is the Aspen group, which comprises the Aspen, Susquehanna, Mammoth, Legal Tender, McGregor, Matchless. The claims of the group taken together constitute one of the best developed properties of the district. There is over 1 mile of work now done. The main working tunnel is 1,800 feet long, and is connected with the surface by 1,000 feet of raises, winzes, and shafts. The surface improvement consists of wagon-road to mine, substantial buildings, machinery, &c. The veins, of 3 to 8 feet, carry galena and gray copper ore in quartz gangue. The gray copper is very rich, high grade, and free from gangue matter, but occurs only in pockets or chutes. The percentage of lead in the galena is quite high. The group is the property of the San Juan and New York Mining and Smelting Company. The Gray Eagle, also on Hazelton Mountain, has produced 106 tons of ore, averaging 50 per cent. of lead and 60 ounces of silver. This mine is one of the best properties on the mountain, and when the company shall have provided themselves with suitable means for handling the water which now floods the lower level it will become a large and constant producer.

On Kendal Mountain, within half a mile of Silverton, are the Idaho No. 1 and Idaho No. 2, which are developed by two 100-foot levels, showing a continuous pay streak, averaging 18 inches in width, and assaying 50 ounces in silver, 30 per cent. in lead, 15 per cent. copper, and $10 in gold.

Adjoining Hazelton Mountain on the east is Round Mountain, on which are located a large number of very strong veins. During 1882 the producing mines were the Silver Lake, Round Mountain, and Potomac.

The Silver Lake shipped ore milling 50 ounces of silver and 60 per cent. of lead from a 2-foot pay streak.

The Round Mountain and Potomac show bodies of ore ranging from 1 to 3 feet in width, but owing to the high elevation of these mines nothing but assessment work has been done. Altogether they have produced 160 tons.

On Green Mountain, in Cunningham Gulch, is the Green Mountain mine, comprising three claims, the Green Mountain No. 1, Green Mountain No. 2, and Green Mountain Extension. All three locations are on the same lode, which is traceable for some distance. This mine is owned in London, and work has been vigorously prosecuted during the entire year. Three principal levels have been driven, covering a vertical distance of 500 feet. The main level has reached a point 340 feet from the surface. The ore-streak has averaged 2 feet in width during the work of the year. The ore is galena, carrying small quantities of very high grade gray copper. The company have employed a jig with great success for dressing their fine ore.

The French Boys Mining Company, on the summit of King Solomon, has 8 men at work. They own the King Solomon, Jura, Mountain Queen, Mary Vinot, Republic, Mountain Quail, and Big Giant. The property was worked all summer with a force of 20 men. The mines have been opened up in a thorough manner, and have shipped 75 tons of ore during the summer. The work for the winter contemplates 800 feet of development, which will consist of drifts and raises, all of which will be on mineral. By this work a large amount of ground will be opened and prepared for stoping out the ore another season as soon as it can be shipped from the mine. The contractors running the lower eastern drift on the King Solomon lode struck a fine body of mineral. The ore is high-grade galena, and the mines owned by the company carry fine pay streaks. The company is regarded as one of the most substantial in the country.

In Ruby Basin, northwest of Silverton, is the Hidden Treasure. An adit of 30 feet and a 10-foot shaft on a clearly-defined vein of 7 feet shows some carbonates, galena, iron and copper pyrites, and gray copper ore. The location is good; the ore runs 90 to 110 ounces silver and 55 per cent. lead.

The Lookout Mountain and Frisco belong to Evans & McGrue. The Lookout Mountain has a tunnel 78 feet that will also, when further in, cut the Frisco lode. The two veins cross each other at right angles. Ore, galena, and soft carbonates.

In Ross Basin there are a number of mines of prominence. The Caucasus, M. E. Harrison, and Emma are all locations on one vein, running a distance of 3,800 feet. This vein on the surface measures in many places 150 feet in width, and shows good galena and gray copper. A number of adits, shafts, drifts, and levels on the vein discloses the existence of two mineral belts. In the vein near the hanging or south side wall is a mineral belt ranging from 3 to 10 feet in width, which may be called the galena belt. It carries galena, zincblende, antimony, iron and copper pyrites, and lead carbonates in a quartz gangue. The ore varies in different openings, some showing little or no zinc, others no carbonates, and some a less percentage of gangue matter than others. The average is 15 to 30 ounces silver and 20 to 50 per cent. lead. The mineral belt on the foot wall is also very clearly defined, averaging from 2 to 12 feet in width, and carrying gray copper in a quartz gangue, and but little zinc, galena, iron and copper pyrites associated with it. This ore will average from 50 to 150 ounces silver by a reasonable sorting from the gangue matter.

The Black Heath adjoins the above group, but is on a different vein. It has a 50-foot shaft, with 30 feet drift from bottom, and several open cuts. The vein is 6 to 9 feet wide, with a quite uniform pay streak of 2 feet. The ore is a gray copper, copper pyrites, and small amount of galena and blende in a quartz gangue, averaging by sorting from quartz 100 ounces silver.

The Boss is a large vein but little developed, having but a 30-foot shaft and three small adits. In the shaft is a mineral body 4 feet wide, carrying in a quartz gangue fine-grained galena, antimony, zinc, and copper pyrites, and averaging, without sorting, 35 ounces silver.

The Winchester vein crosses that of the Boss, and is opened by a short tunnel and two cuts; the pay streak is 4 feet in width.

The Mineral King lode is situated on Prospect Basin. The ore is galena and gray copper in heavy spar, the gray copper indicating the presence of bismuth or Alaskite by its color, and the galena having white iron and oxide of iron mixed through it. The ore is very high grade.

In Iron Gulch, on Red Mountain, is the Columbia. This mine is developed by two shafts on the vein, showing a vein of ore 4 feet in width, having widened from 6 inches. Fine mineral has been struck in the upper workings. A force of men are getting out ore, all of which is of an assay value, running from 100 to 500 ounces in silver to the ton.

The Congress is a new discovery situated on the divide between San Juan and Ouray Counties. A shaft has been sunk to a depth of 92 feet; 65 feet of the shaft has passed through solid ore; 50 feet of drifts have been run from the shaft, and the ore-vein or deposit has been proven to be 18 feet in width. A cross-cut tunnel 280 feet in length is being run to intersect the shaft at a depth of 80 feet. One hundred and ten tons of ore were shipped from the mine in 30 days, all taken from the shaft. The ore already shipped has netted in Silverton over $100 per ton, having given the following results per ton: 1st, 27 per cent. in copper; gold, 1½ ounces; silver, 18 ounces. 2d, copper, 33 per cent.; gold, 1⅓ ounces; silver, 20 ounces. Occasional assays have yielded 60 per cent. in copper, 3½ ounces in gold, and 30 ounces in silver. The cross-cut tunnel is now in 160 feet and is being prosecuted under contract. The mine will be a large producer another season.

Adjoining the Congress is the Senate, a claim of similar character, but of less development. A shaft has been sunk upon this property to the depth of 20 feet, from the bottom of which a drift has been run east 20 feet, and is now approaching the ore-body. This bids fair to prove a good property.

Three hundred feet east of the Congress lode is the Salem. This lode shows a different character of ore, running very high in copper and gold. There is now a shaft down 8 feet and an open cut 25 feet long. Two car loads of ore have been shipped, with flattering returns.

The Hudson is a northern extension of the Salem. It was located during the summer, and in September the owners commenced the erection of cabins and made preparations for working the mine during the winter. Twelve feet from the surface, in sinking the shaft, they struck a solid body of mineral, which embraced the entire width of the shaft, and which has been continuous to the present depth obtained, 46 feet. At the bottom of this shaft a cross-cut has been run through a solid body of mineral 11 feet. The mine has produced 1 ton of ore per day to the man since work was commenced in September. There is on the dump 175 tons of ore; on all sides of the shaft for 36 feet in depth there is solid ore, and at the bottom 10 feet of mineral is exposed. The ore is an antimonial sulphide of copper, carrying silver and gold. Mill runs give 32 per cent. in copper, 29 ounces in silver, and half an ounce in gold to the ton.

The Yankee Girl group comprises five or six locations, chief of which are the Yankee Girl, Orphan Boy, and Robeson. The ore is very different from the Hudson, Congress, and Salem, being a galena and copper ore, running high in silver. There are two shafts on the Yankee Girl, one 40 feet and the other 50 feet deep. The lower shaft has been sunk through solid mineral, and the upper shaft shows 4 to 5 feet of mineral. Four hundred tons of ore has been shipped.

A shaft is being sunk under contract on the Orphan Boy, which is now 44 feet deep, and in the bottom of the shaft there is a fine body of high-grade mineral.

In *Eureka district* there are a number of mines rapidly becoming steady producers.

The Tom Moore Mining Company own the Tom Moore, Robert Burns, Byron, G. F. Parmelee, and Emma, the chief of which is the Tom Moore mine. Its development includes two tunnels, and two drifts from the first or lower tunnel, in all aggregating 600 feet, besides 100 to 200 feet of adits or open cuts. In the open cuts and directly at the surface are bodies of galena and gray copper. The lower tunnel is a cross-cut not yet to the mineral body.

On the Byron a tunnel of over 500 feet has been run in on the vein, which carries remarkably fine galena with the addition of considerable zinc. Associated with the zinc, but not mixed or combined, is a streak of very high-grade silver ore. Outside of the adits and shafts on the group there are over 1,100 feet of drifts and tunnels. From the open cuts and shafts have recently been taken 100 tons of ore, now awaiting treatment at the Martha Rose smelter, at Silverton. This ore averages 50 to 60 per cent. lead and 50 to 80 ounces silver per ton. A tramway or cable from the tunnel of the Tom Moore to the road, and a suitable concentrator—two enterprises under advisement—will reduce the working of these properties to a minimum cost.

On Eureka Mountain the Rarus Consolidated Mining Company have a group of seven claims, consisting of the Ben Bolt, Rarus, Iroquois, Imogene, C. G., Grand View, and Hattie. The first two mentioned are patented properties, the others being more recent locations. The veins which they cover are all very wide, three of the widest being from 30 to 40 feet. The assays from the claims worked thus far show the average to be on the Rarus 75 per cent. lead and 20 to 60, or an average of 40, ounces silver. On the Iroquois, 84 per cent. lead.

The Grand View has ore assaying $24 gold and $80 silver; total, $104 per ton.

Hattie gives returns of $49 gold and $34 silver; total, $83 per ton.

Eureka Gulch is divided into North and South Forks.

In the former are the Washington and No Name, two mines having very large bodies of fine-grained galena ore, which, when concentration facilities are afforded, will be most valuable properties.

The Ben Franklin and Sunnyside, in the same locality, have been developed with satisfactory results.

The Grand Duke has a 20-foot adit and a cross-cut tunnel of 30 feet. Vein opened by adit is 20 feet wide, with 5 feet of pay. The ore, a gray copper in spar gangue, mills as high as 300 ounces.

Adjoining the Grand Duke is the Belle Creole, opened by 15 feet of shaft. The vein is 40 feet wide, with mineral throughout the shaft. The ore is iron and copper pyrites, galena, zinc, and gray copper, averaging by assays at bottom of shaft 160 ounces of silver per ton, and at the surface good assays on antimonial silver were made.

In the South Fork of the gulch the Red Cliff Company own eleven claims in two separate groups—the Herald group, on Silver Mountain, and the Astor group, on Tower Mountain.

The different locations of the Herald group vary nearly 1,000 feet in elevation, consequently tunneling at the lowest points will gain considerable depth upon the veins located highest on the mountain.

The Astor group has five locations on one vein and two on cross lodes. All the company's properties have several assessments on them, but none have attained a sufficient depth to demonstrate much of the probable output of ore in the future.

The Silver Globe Company have fourteen lode and placer claims adjoining each other on Silver Mountain, near the head of South Fork of Eureka Gulch. Five of these claims are on one vein, the others, being one, two, and three, on cross-lodes to the main or Silver Globe vein. A tunnel, now in 525 feet, will cut the Silver Globe, Lillie B., Mary H., Chester A. Arthur, and two other lodes. Only a few feet more work is required to cut the first of these at a depth of from 500 to 600 feet from the surface. A second tunnel, now in 300 feet, follows the vein of the Romantic claim. This vein is 12 feet in width. The mineral is disseminated throughout the vein, but at the breast of the tunnel shows evidences of concentrating on the hanging wall. The iron ore and copper pyrites and galena will by concentration be made very valuable. Some 30 tons are on the dump. The Romantic tunnel will also cut three other lodes which cross the Romantic—the Grand Prize, Silver Globe No. 3, and New York.

The Holliday Mining Company own two groups, the Denver and Starlight, the first of five and the second of three claims.

The Denver group is on Silver Mountain, and is developed by a tunnel of 60 feet on vein, another tunnel cross-cut of 60 feet 100 feet below the first tunnel, a drift of 100 feet from breast of lower tunnel, and assessment shafts on top of mountain.

The Starlight group have $1,000 worth of development, including a lower main working tunnel.

At the base of Jones Mountain is a fine group of claims, comprising the La Plata Grande, Great Western, Pavilion, Specie, and Cañon.

The La Plata Grande has an open cut of 40 feet face and a 12-foot tunnel, both on a mineralized streak of 6 to 8 feet. The ore is sulphurets, galena, gray copper, iron pyrites, and zincblende. Ore from the sulphuret streak assays 1,500 ounces of silver per ton. There is also on the vein another mineralized streak, opened by a small cut. This streak is about 2 feet wide.

The Great Western is on the west bank of the Animas from La Plata Grande, extending from river full length of claim, 1,500 feet. It has a cross-drift of 40 feet, shaft on vein 25 feet, and adit of 30 feet floor. The vein is quartz 10 feet wide, with an ore streak of 4 feet, the ore being iron pyrites carrying bismuth silver in quartz gangue. Alongside the iron-ore streak is a side seam of decomposed honeycomb quartz carrying galena and gold ore. The average of the iron ore carrying bismuth silver is 40 to 70 ounces per ton.

The Pavilion, Specie, and Cañon are deserving of mention

Animas Forks district includes the mines tributary to Mineral Point.

The two camps are about 2 miles apart and are situated at altitudes of 10,000 and 12,000 feet respectively above sea level.

The Columbus mine, situated close to the camp of Animas Forks, is owned by Eastern parties. The developments consist of a 97-foot tunnel and a shaft 55 feet from the tunnel, 30 feet in depth. The tunnel runs alongside the main vein and will be continued 30 feet further when a cross-cut will be run. The vein is remarkable in size. At the tunnel entrance it shows mineral 16 inches in width. The hanging wall is about 40 feet from the foot wall. A 10-foot vein of fine mineral is exposed at a depth of 10 feet, 300 feet above the mouth of the tunnel. Assays from the lower workings show an average of 65 ounces silver, 65 per cent. lead, 5 per cent. copper, and $8 in gold per ton. An assay from the mineral 800 feet above the tunnel mouth runs $100 in gold. The management work 11 men continuously and the shaft will be sunk 200 feet deep.

The Silver Coin is situated on Treasury Mountain and is opened by a cross-cut tunnel of 100 feet, a tunnel on a vein of 50, and on another vein one of 30 feet, also several adits and shafts on the different locations. The first vein the cross-cut tunnel will cut is on the surface 14 feet wide, with a pay streak of 4 feet of galena. Assays near surface averaged 40 ounces of silver and 60 per cent. lead.

The Lulu, in Grouse Gulch, is one of the best mines in that vicinity. From the end of a cross-cut tunnel of 40 feet a drift has been run on the vein 100 feet. The vein, 3½ feet between wide walls, with an 18-inch streak of pay mineral, has copper and iron pyrites and galena ore, averaging 50 to 70 ounces silver per ton. One hundred feet above the lower drift is a second one on the vein of 35 feet, entering from the surface. The ore in the second drift averages from 100 to 500 ounces of silver. From the second drift to the top of the mountain, a distance of 500 feet, the mineral as shown by croppings is continuous, and as far as ascertained averages 100 ounces per ton. Above the second level about 200 feet another cross cut to intersect the vein at 35 feet is started. The croppings of the vein at this point are heavy copper pyrites running 100 ounces silver with an 8-inch galena streak alongside which assays 80 ounces and 40 per cent. lead.

The Little Dora, also in Grouse Gulch, is rapidly acquiring prominence A cross-cut tunnel, now in 80 feet, will cut the lode at 100 feet, while near the center of the claim is a shaft exposing 22 inches of very rich mineral. Five assay tests on large lots of ore taken from this shaft run from $100 to $1,500 in gold and silver. The ore is chlorides, brittle silver, and gold in line with a quartz gangue.

The Dixie, on Cinnamon Mountain, half a mile from Animas Forks, has a 10-inch pay streak of galena. The mine has been but little developed.

The Belle of the Animas is in Burns Gulch, 2 miles from the camp. The ore is copper, carrying gold and silver. It is regarded as a valuable property.

The Sioux City adjoins the Belle and is but little developed. The ore carries galena, zinc, iron, silver, and gold.

The Bonanza tunnel on Mineral Mountain is a cross-cut tunnel intended to cut certain prominent lodes visible on the surface, and also such blind lodes as may be encountered. The first blind lode struck wa the Yankton, which showed good mineral; afterwards the Olmstead was encountered and crossed. The J. B. Norris, an immense lode, fully 130 feet in width, was crossed some time since, and was fully as wide in the tunnel as on the surface, and has a 4-foot pay streak of pyrites of copper, arsenical iron, carbonates, and sulphides of lead. This was the second main vein cut by the Bonanza tunnel, and was crossed 500 feet below the surface. At a further distance in the tunnel a lot of spurs, feeders, and cross-veins, seven in number, have been encountered. These show fine bodies of mineral from which assays in silver of 208 ounces and in gold of 2 ounces to the ton have been returned. The tunnel is 1,400 feet in length. It is the property of the Silver Peak Mining Company, an English corporation, the management being in the hands of Messrs. W. McFarlane and F. M. Walters.

The Mineral Mountain Mining Company own twenty-eight claims, as follows: The Red Cloud, Burrows, Burrows No. 2, Burrows Extension, Deposit, Dakota, Mineral Point, Mastodon, Napoleon, Vermillion, Vermillion Extension, Yankton Extension, Cleveland No. 1, Cross, Washington, Diamond, Crooke, Yankton, Wonderful, Fanny Grigsby, and Equator, all of which are 1,500 by 300 feet, together with the Prince Albert, Denver, Victoria, Del Norte, Crystal, Lyon, and Bond. Of these the Red Cloud, Deposit, and Burrows No. 2 have been the most developed. On these mines there are upwards of 2,000 feet of development in shafts, tunnels, and winzes. The veins exposed vary from 3 to 10 feet in width, the average on Red Cloud being 5 feet. No stoping has yet been done, the ore now on the dumps having been taken out in sinking shafts and drifting. The ore, which occurs in fairly continuous pay streaks of 18 to 54 inches, is galena, copper and iron pyrites, gray copper, gold in quartz, and zinc. The grades are not mixed, but occur in separate and distinct bodies. The galena body averages 30 per cent. lead, the copper body 5 to 8 per cent. copper; the gold varies from a trace to 1½ ounces. The zinc, which only occurs in pockets, is alongside gray copper as a usual thing, very rich in silver. All the ore, taken as a whole in the entire pay streak, including all gangue matter, averages over 50 ounces silver per ton.

The production of the mine from the workings is estimated at 1,000 tons, all of which was taken out of shafts, drifts, and cross-cuts. Work will be discontinued for the winter, during which time the owners will be busily engaged in arranging for active operations as early as possible in the coming spring by placing heavier machinery upon the mine and putting large forces of men at work drifting, stoping, and cross-cutting the vein, in order to allow 100 men to work if necessary. They will also consider the feasibility and importance of building a tramway from the mine to Eureka, from which point it is expected a railroad will be running.

The Great American, on Lake Mountain, near Mineral Point, is a fine property. The vein, 10 feet in width with a 3 to 4 foot pay streak of galena ore, is traceable on the surface by distinct croppings for a distance of a mile or more.

The Ben Butler, near the Great American, lies in the same general direction with and overlooking the Red Cloud mine. The vein is one of the very wide ones, and where worked shows finely in gray copper and galena ore.

The Lake Park is the property of the Colorado Mining and Land Company, who have made arrangements for extensive working. The vein is from 4 to 6 feet in width, the general character of ore exposed being galena, gray copper, and a quartz-gangue matter carrying gold. An average of ten assays made in Buffalo, N. Y., from ore shipped in bulk from the different locations, gave $380 in gold and silver per ton.

Across the gulch on Siegel Mountain is the Blacksmith, on the same vein as the Great American. The vein is about the same width with same amount of pay as on Lake Mountain. The Blacksmith has a 25-

foot tunnel, showing an ore-body of galena, gray copper, sulphurets, iron and copper pyrites, and bismuth iron.

At Mineral City is the Bill Young mine, one of the oldest locations. The development consists of an open cut 28 or 30 feet long, exposing the vein to a depth of 15 feet at the breast and about 20 feet wide. At this point a shaft was sunk two years ago 65 feet, from which a great amount of valuable brittle, ruby, and sulphuret ore was taken, averaging, by assay, from 800 to 1,300 ounces silver. Some of the richest specimens of ruby and brittle silver ore were taken from pockets at bottom of the shaft, and a rich pay streak, averaging 28 and 30 inches, was exposed.

There are many other locations in this section of the county which, by a comparatively small expenditure of capital, will become producing mines.

The county's production during 1882 was $10,000 in gold and $60,000 in silver.

SUMMIT COUNTY.

The principal district of Summit County is *Ten Mile district*, which embraces the valley of Ten Mile Creek from the summit of the Continental Divide, west to the summits of Sheep, Elk, Chalk, Jack, Tucker, and Cooper Mountains.

The principal mining towns are Kokomo, Recen, Robinson, Carbonateville, and Wheeler's. Kokomo and Recen adjoin and are practically one town.

This district comprises both fissure and contact veins, the producers at present being principally the contact. The formation of the contact veins consists of a lime or dolomite floor, and a sandstone or metamorphic grit for the cap or hanging wall; so far as developed they show remarkable continuity, averaging 4 feet in thickness, the vein filling consisting principally of carbonate of lead and carbonate of iron, the pay ore occurring in chutes running through the mass. These chutes average from 100 to 250 feet in width, with a trend usually to the northwest. It is assumed they carry higher ore as depth is attained. The average grade is about 30 ounces in silver and 35 per cent. lead. This is the showing of the producers. A great many of the properties already developed upon these contact veins give a still stronger showing in dimension of ore-body. The ore, however, has proved low grade and rebellious, but is particularly adapted to concentration.

The fissure veins occur upon the east side of Ten Mile Creek, and are of a higher grade, so far as the product of ore proves, but the country being so much more rugged has retarded development. The chief developments, therefore, are upon the more readily mined carbonate sections and contacts.

Among the many mineral-producing hills of the district Sheep Mountain stands in the front rank, and the most notable mine of the mountain is the Robinson, whose ore chute has had an average width of 130 feet. The bodies of ore from which shipments were made have assumed the nature of kidneys in fissure veins. The great bonanza, averaging about 115 feet in width and 12 feet in thickness, was encountered at a vertical depth of about 80 feet from the surface, and the same distance from the mouth of the incline. The length as developed by the incline was about 300 feet. Low-grade ore was then encountered for another 300 feet, when the grade improved in the seventh and eighth levels, being another kidney not so large nor high grade as the original bonanza. From the eighth level down to the present lower workings on the eleventh level, the grade has been gradually deteriorating, although the proportions of the chute are as large as at any time in the history of the mine. From this it is concluded that other bonanzas in the shape of kidneys or pockets may again be encountered by further development.

This mine has suffered in reputation from mismanagement and overworking. The richest deposits were thought to have been exhausted and the main incline was allowed to fill with water for 600 feet. Under a new management the mine was drained and development work inaugurated, the result of which has been to demonstrate that it is possessed of large resources.

Important discoveries of ore were made in the old workings, particularly on the fifth and ninth levels. The eleventh level exceeds in value and quantity of ore any level opened since the seventh. The level has now extended 125 feet in ore. The body varies from 6 to 10 feet in thickness and the quality is good, averaging from 45 to 50 ounces. Connection has been made with the new east shaft and a large heavily-timbered station put in.

The prospects of the mine for becoming a large producer are regarded as highly favorable.

Adjoining the Robinson on its upper end and crossing the same lime ledge lies the property of the Idalia Company, in which was disclosed a fine ore chute, the extent of which was never ascertained, as surface water came in in such quantities as to stop work and necessitate the placing of machinery on the property. The company is sinking a working shaft 100 feet in advance of the old workings. The shaft is down about 35 feet, and expected to go 30 feet more before mineral will be reached.

The Gray Eagle, above the Idalia, shipped considerable ore, but development work not having kept pace with the extraction of ore, the latter was suspended until the mine could be put into better shape to make a steady production.

The Ballarat adjoins the Gray Eagle. It was located in 1878, but no work of consequence was done until 1881. It shows good ore in the shaft, but mining has been seriously retarded by a large flow of water.

The Wheel of Fortune on top of the mountain had been idle for some time, owing to disagreements among the owners, but was leased to Messrs. Hutchinson and Ryan, who drove a working incline to a large body of pay ore, replaced the old machinery with new, and have prosecuted work with energy. They have been making steady shipments, have got the property in good shape, and will make the mine yield the owners a handsome profit.

In the Rambler, about 600 feet north of the Wheel of Fortune, the ore-body is about 4 to 5 feet thick, and consists of iron and spar carrying galena. A previously discovered ore-body in this mine ran 50 to 90 ounces to the ton and 50 per cent. in lead.

The Sarsfield is located near the Wheel of Fortune. The development consists of a 60-foot shaft. The ore-body is about 10 feet in width and is in place. The mineral is galena.

The Bay City tunnel is located on the southern slope of Sheep Mountain, and is prospecting the ground between the Wheel of Fortune and Gray Eagle Mining Company at a depth of 300 feet. The tunnel is in 500 feet, and its face is in iron and lime, showing up a new contact vein. The owners of this property intend to sink on this contact.

One of the most important and extensive properties of the Ten-Mile district is that of the Graphic Mining Company, which owns eight locations on Sheep Mountain southeast of the Robinson mine. The principal claim is the Crown Point, on which work is being actively prosecuted. A new incline is being run, new machinery has been erected, and under the able management of Mr. Parker the mine will soon become a large producer. There are about 700 feet of development in the mine, and the intention is to retain on hand large ore reserves. The ore is of a very high grade and easily treated, giving mill-run returns of from 200 to 600 ounces silver.

The Little Chief and Lucky Boy have a tunnel 150 feet to cut both ledges; this has already crossed two feeders, the first 2 feet, the second 10 inches; assays 50 ounces silver, trace of gold. This valuable property is being put in perfect shape. A force of 25 men is employed, and it will not be long before the Chief will be one of the largest shippers on the mountain.

The Michigan is the property of the Hopewell Company. It has a shaft 120 feet deep with levels 700 feet; works 24 men on eight-hour shifts. The ore-body dips about 40° northeast and lies between the sandstone and lime, accompanied by the shales which form the contact matter in this district, and is apparently the apex of one of the ore chutes which traverse the Sheep Mountain contacts. The ore, which carries very little gangue and only a small quantity of iron pyrites, gives returns by analysis of 19 ounces silver, 70 per cent. in lead, and an appreciable amount of gold. Unlike most of the Sheep Mountain ores it is not refractory, the analysis showing no zinc, antimony, or arsenic. A level has been started from the drift to avoid the inconvenience of working through the upraise and facilitate the extraction of ore, and shipments will be begun as soon as the mine can be put in convenient shape for working, as the shaft is already provided with hoisting machinery and a commodious shaft-house.

The Snow Bank adjoins the Michigan on the east. The shaft is 105 feet deep. There is some refractory ore, averaging 18 ounces silver and 40 per cent. lead. Of this there are 750 tons on dumps. The new workings adjoining the old shaft are being developed with flattering results. The ore from this mine, as well as that from the Michigan, could be worked to the best advantage by concentrating.

On Elk Mountain is the Aftermath, the property of the American Mining and Smelting Company. It is worked by an incline shaft 665 feet deep, having 10 levels, or a total of 2,200 feet of exploration, from which ore was secured. The tenth level connects with the Milo mine lower level, which, in turn, connects with the location south until reaching the surface on the east slope of the mountain. This mine has produced 11,000 tons of ore, averaging 30 ounces silver and 20 per cent. lead. The ore is chiefly sand carbonates, and cheaply and easily mined and smelted. The owners paid $250,000 cash for this mine.

The Milo, adjoining and immediately below the Aftermath, is 300 feet wide, of sulphuret ore averaging $30 per ton. The working shaft is an incline 550 feet deep with levels every 50 feet, from which ore is constantly shipped. They have so far taken out $200,000, the ore average being as stated. The output is about 5 tons per day, part of which goes to Greer's concentrating works and part to Doncaster's.

The White Quail Company owns the White Quail group of mines, on Elk Mountain, and has produced considerable ore. It is owned by Philadelphia parties as a close corporation. It commenced output just below the surface, and to the present has produced 6,750 tons, or an average of 30 ounces silver, 1 ounce gold, and 4 per cent. lead per ton. The ore is treated at the White Quail Company's smelter, which has a capacity of 40 tons daily. The smelter was originally built by a Pittsburgh company for custom work, and was bought by the present company for $70,000. The mine was purchased for $180,000. The workings aggregate about 1,700 feet. Considerable ore was extracted during the past year, a portion of which was shipped and the rest treated at the smelter, but through mismanagement the profits of the mine were absorbed in developments or otherwise expended and the property is now idle.

The Raven and Eagle is being worked by a tunnel 745 feet with upraises. It is arranged to connect with the lower levels of the Milo, Aftermath, and White Quail; 11 men are worked. Connection with the above mines will be at 500 feet depth. Considerable carbonate ore has been extracted, and 4,000 tons of good carbonate ores are now blocked out in this mine.

The Badger is one of the most promising properties on Elk Mountain. It is opened by an incline several hundred feet in length, and recently connection has been made with the consolidation tunnel by means of which ore can be extracted with greater facility and economy than heretofore, as considerable difficulty has been experienced in working through the incline on account of water. The mine has already produced a large quantity of good ore.

A very promising strike has been made in the Little Ida claim, lying on the western slope of the mountain. A shaft has been sunk on the property to a depth of 90 feet, in which a body of excellent ore has been struck and penetrated for a distance of 7 feet. The average assay of the ore-body is 53 ounces in silver and 10 per cent. in lead, while a 6-inch streak yields returns of from 300 ounces into the thousands in silver.

On Jack Mountain the majority of the veins are fissures, although there are 4 separate lime-porphyry contacts.

The Queen of the West is on the eastern slope of the mountain. The vein is run from 12 to 50 feet wide, all of which carries more or less mineral. The rich streaks carry galena and black sulphurets. The walls are sandstone and porphyry, which seem to alternate in position of hanging and foot wall. There are three shafts on the property, besides 400 feet of drifts and 100 feet of cross-cuts, and in every shaft and drift mineral has been found.

No. 1 shaft, which is the discovery shaft, is 50 feet deep on the western end of the property. Some fine ore has been taken from it, bnt at present the bottom is in decomposed porphyry and quartz. A pocket of rich ore was found about 43 feet from the surface, and to explore this a drift is being run to connect with shaft No. 2.

Shaft No. 2, 450 feet east of shaft No. 1, and further down the hill, is 100 feet deep, and has four drifts running from it, all in mineral. From above the 60-foot drift a small amount of stoping has been done, and 200 tons have been shipped this year.

Shaft No. 3, 270 feet east of shaft No. 2, and further down the hill, is 50 feet deep and has one drift running toward shaft No. 2, all in mineral. The design, of course, is to drive a tunnel from shaft No. 3, so as to get the ore out without hoisting. The mine is well timbered throughout and perfectly dry. Where the vein is being penetrated at the lowest point it is showing mineral of a superior grade to any yet found in the mine.

The Mayflower adjoins the Queen of the West on the east. The main tunnel is run 600 feet, but the lode proper was discovered 330 feet from the mouth. Here 70 feet of development has been done at right angles on the vein and 60 feet on the left. Six men are employed. Owing to former disagreements of the owners, whereby work was retarded, the development has been rather slow for the past two years.

The Ida Lee has a 4-foot vein of pay ore at several points carrying 60 ounces silver, 4 to 6 ounces in gold per ton. Adjoining the Ida Lee claims on the west is the John Mattson tunnel, in 129 feet, where an 8-foot vein is encountered, carrying low-grade ore in contact of lime and shale, not profitable to treat with present facilities.

The Delmonico adjoins the Ida Lee, and is the property of the Bonanza Gold and Silver Mining Company. It is a contact vein with galena and carbonate ore, ranging in value from $70 to $500 per ton. The mine is worked by a tunnel 320 feet in length. At a distance of about 200 feet the management commenced to drive on the vein, which is almost perpendicular, and the shaft is now about 50 deep feet. The vein is widening with depth and improving in quality.

The Selma is situated on the southern slope of the mountain in Searl's Gulch, and has rapidly developed into a valuable property. The vein is reported to be 13 feet wide of galena yielding 60 to 70 ounces of silver to the ton and 40 per cent. of lead.

On Fletcher Mountain, about 6 miles from Kokomo, the principal locations are owned by the Crœsus Mining Company, Peerless Mining Company, and Matchless Mining Company. They are fissure veins above timber line. The ores are high-grade galena, carrying native and brittle silver.

The Crœsus is running a 40-foot tunnel, and has two shafts above.

The Colorado Land and Mineral Company own the Bernadotte, Maximus, Maximus Extension, and Orestes, known as the Maximus mines. The company have had a large force of men employed developing their property since the 1st of August. They have driven one tunnel 53 feet, and have just started three others that are in from 10 to 20 feet, all showing fine mineral and true fissure veins. They have taken out in the mean time quite a quantity of fine mineral from the surface by opening cuts on the veins, which have given returns from the smelter running from $150 to $200 per ton.

Union district is situated northeast of Breckenridge, and comprises Gold Run Basin and the adjacent slopes. Gold Run is a tributary of the Swan River, having a northwesterly course, east of Gibson Hill and west of Silver Hill, a spur from Mineral Hill running north between Galena Gulch and Gold Run. Its length is about 4 miles from its mouth to the northeast flank of Mineral Hill. In this gulch, in the early history of gulch mining, a large amount of gold was taken out. Several properties are still being operated, the principal being the central portion of the gulch owned by L. Peabody. A large force of men are profitably employed. Its area is one-half mile from north to south, and three-fifths of a mile from east to west. The water to operate this property is conveyed from the Blue River at a point 4 miles south of Breckenridge, by a ditch 9½ miles long.

George A. Mumford owns the lower and northern portion, embracing Buffalo and Kentucky flats, comprising 650 acres, which is regularly worked. It is a valuable property, and probably contains large quantities of gold, which escaped from the workings above.

South of Peabody's claims the upper portion of the basin is the property of the Gold Run Placer Mining Company, represented by C. T. Bellamy and 50 acres of patented ground.

In digging the ditches and working the placers deposits of galena were discovered, and at one point carbonates were uncovered. This was near the last-named property, on the west slope of Silver Hill. This discovery was located as a claim and called the Wilkesbarre. Other locations were made at an early day, but were subsequently abandoned. During the last year some of the old workings were reopened and new discoveries made that gave an impetus to lode mining in the district.

On Silver Hill there is a group of eight claims owned by Mr. Milley, of Montezuma.

On the Orphan Boy, owned by Wilson & Coulehan, the shaft is about 15 feet deep in mineral, and there is a good showing of galena on the dump.

To the southeast is the John J., Hard Times, and an unnamed claim, the extension of the Iron, altogether forming a group of promising claims, discovered during the past two years.

Near the head of Green Gulch is a group of mines lying on both sides of the gulch.

The Ohio, located in 1881—a shaft of 60 feet. The porphyry is heavily stained with iron, and the dump shows considerable galena.

West of this and adjoining is the Wild Cat; the shaft is down some 50 feet, and the vein is 10 feet between walls. The shaft is protected by a house, also used for storing ore.

Adjoining the latter claim on the north is the Cooper, a promising claim, showing bodies of galena.

Next north is the Reese, owned by Thompson & Reese, in the same formation.

The Highland Mary is owned by Hunter, Reese & Thompson, showing galena and iron, considerable work having been done by shafts and tunnels.

The Lafayette is a partial claim owned by D. J. Thompson.

The Ida is owned by Thompson, Taylor & Allen.

The Lexington is the last of this group, owned by C. A. Westover.

On the west slope of Macoupin Hill are six valuable claims belonging to Judge A. H. Breman, and in the same vicinity are two belonging to R. A. Sankey. Both these gentlemen, who are largely interested in mining, have great faith in the mineral resources of this section and propose to continue active operations on the property in which they are interested.

At *Red Cliff* the Belden is the principal mine. For some time it remained idle, but under the able superintendence of Manager Armitage has been put in first-class shape. Exploitation has been vigorously pushed, and a large amount of ground is now blocked out for stoping.

The Eagle Bird consolidation own twenty-four claims, the principal of which are the Black Iron, Pappoose, Blake, and Eagle Bird.

The Kingfisher, on Battle Mountain, has made important developments during the year.

This section of Summit County is making a steady advance in its mining interest. There is a large number of undeveloped properties which, by an expenditure of capital and labor, would undoubtedly become producing mines.

In 1882 Summit County produced $60,000 in gold and $1,000,000 in silver.

List of mines in Colorado.

PREPARED BY R. S. BARTLEY.

[Names of mines that have produced or are producing, marked with a star (*).]

BOULDER COUNTY.

Name of mine.	District.	Owners or managers.	Post-office address.
*Alamakee	Gold Hill	Thomas James	Gold Hill.
*American	Sugar Loaf	George W. Reardon	Sugar Loaf.
*American Consolidated Mining Company.	Gold Hill	do	Sunshine.
*Amalgam Thief	Sugar Loaf		Sugar Loaf.
Ajax	do	J. H. Jones	Do.
Atchison	Gold Hill	Thomas L. Wood	Salina.
Antioch	Sugar Loaf		Sugar Loaf.
Annex	Jamestown		Jamestown.
Argo	do	E. L. Hubbard	Do.
Amsterdam and Atlantic	Central		Four Mile.
*Baltimore Belle	Jamestown	H. B. Benton & Co.	Jamestown.
*Boulder County Mining, Tunnel and Milling Company.	Grand Island	T. R. Owen	Nederland.
*Baron	Gold Hill		Salina.
Bald Eagle	Jamestown	Rosengarten & Co	Jamestown.
Blue Jay	do	George W. Reardon	Do.
Buckeye	do	W. T. Turner	Do.
Big Thing	do	A. Arnett & Co	Do.
Big Blossom	do	F. L. Higby	Do.
Brunswick	do	Charles S. Schilling	Do.
Buenos Ayres	do	H. A. Haskin	Do.
Buena Gold Mining Company	do	do	Do.
Boulder County M. and D. Company	Magnolia	W. G. Woodward	Magnolia.
Belleville	Sugar Loaf		Sugar Loaf.
Baxter	Ward	John G. Roberts	Ward.
Banner	do		Do.
*Black Cloud	Gold Hill	E. Ramland	Gold Hill.
Buckeye	Central		Jamestown.
Blue Button	Gold Hill		Gold Hill.
*Bella	Sugar Loaf	J. T. St. Clair	Sugar Loaf.
*Caribou Consolidated Mining Company.	Grand Island	George Teal	Nederland.
*Cold Spring Mining Company	Gold Hill	T. Whitcomb	Gold Hill.
*Chicago and Colorado Mining Company.	Ward		Ward.
*Cash	Gold Hill		Gold Hill.
*Colfax	Jamestown	Gillette & Freeman	Jamestown.
Century Consolidated Mining Company	Gold Hill		Salina.
Crusa	Sugar Loaf		Sugar Loaf.
Columbus	Gold Hill	J. R. Luten	Gold Hill.
Crater	Magnolia	A. J. Waggoner & Co.	Magnolia.
Corning Tunnel Company	Gold Hill		Gold Hill.
Credit Mobilier	do		Do.
*Celestial Extension	Ward		Ward.
*Chatham	do	John Rice	Do.
*December Mining and Milling Company.	Jamestown	George W. Bratton	Jamestown.
Denver	Ward	John Rice	Ward.
Denver View	Jamestown		Jamestown.
*Emerson	Sugar Loaf	George T. Geer	Sugar Loaf.
*Emancipation	Gold Hill	—— Kenney	Sunshine.
Ellen	Jamestown	F. L. Higby & Co	Jamestown.
Earl	do	E. D. Moffitt & Co	Do.
Evening Star	do	Heckman & Williams.	Do.
Excelsior	do	O. Christopher & Co.	Do.
Eldorado	Gold Hill	Cook & Thompson	Sunshine.
Fairbank Gold and Silver Mining Company.	Central	H. Charles Ulman	Jamestown.
Fribnrgh	Gold Hill	George T. Geer	Sugar Loaf.
Fortune	do	J. M. Robinson	Gold Hill.
Fanny H	Jamestown		Jamestown.
*Golden Age	do	D. P. Pike	Do.
*Governor's Group Mining Company	do	F. M. Adams, prest.	Do.
*Gray Copper	Sugar Loaf	G. P. Williams	Crisman.
*Gold Hill	Gold Hill	J. B. Copeland	Gold Hill.
Great Britain	do	—— Churney	Four Mile.
Geer	Magnolia		Magnolia.
Good Hope	do		Ballarat.
Gillaspie Tunnel	Jamestown	John Gillaspie	Jamestown.
Gold Deposit Gold and Silver Mining Company.	do	George Du Bois	Do.
Garfield	Magnolia	C. R. Tippett	Magnolia.

List of mines in Colorado—Continued.

BOULDER COUNTY—Continued.

Name of mine.	District.	Owners or managers.	Post-office address.
Goldsmith Maid	Gold Hill		Gold Hill.
Giles	Ward		Ward.
Gray Bird	Ward		Do.
Gladiator	Jamestown	Cyrus Taylor	Jamestown.
Grand Central	do	Fox, Cole & Co	Do.
Gold Dirt	do	G. B. Stanley & Son	Do.
Great Eastern	do	Corkle, Rayford & Carter.	Do.
Gold Medal	Gold Hill		Gold Hill.
*Horsefall	do	A. Von Vendt & Co.	Do.
Hoosier Mining Company	do		Boulder.
Hastings Mining Company	Sugar Loaf		Sugar Loaf.
Humboldt	Jamestown	Dr. McBeth	Jamestown.
*Inter-Ocean	Gold Hill	Wiswald, Thompson & Co.	Sunshine.
*Ingram	do	Buckingham & Co	Salina.
Iron Queen	Jamestown	Shock & Clark	Jamestown.
*John Jay	Sugar Loaf	A. J. Van Deven	Sugar Loaf.
*Jamestown	Jamestown		Jamestown.
*Junction	do		Do.
J. Alden Smith	do		Do.
Joe Dandy	do		Do.
*Kikionga	Magnolia	Smith & Lonegan	Magnolia.
*Keystone	do	Theo. Widerhold	Do.
King William	Ward		Ward.
Kingston	Gold Hill		Sunshine.
*Logan	Sugar Loaf		Crisman.
Lady Franklin	Magnolia		Magnolia.
Longfellow Mining Company	Jamestown	T. F. Simmons	Jamestown.
Little Dorrit	Magnolia	C. G. Buckingham	Magnolia.
*Mountain Chief	Gold Hill	—— Pugh	Sunshine.
*Mountain Lion	Sugar Loaf		Sugar Loaf.
*Magnolia Mining Company	Magnolia	C. G. Buckingham	Magnolia.
*Monongahela	Gold Hill	William Edwards	Sunshine.
*Melvina	do		Gold Hill.
Maud	Magnolia	M. J. Commerford	Magnolia.
Matt	Sugar Loaf		Sugar Loaf.
Morning Star	Ward		Ward.
*Merchants and Miners' Tunnel Company.	Jamestown	J. Jay Joslin, pres't.	Left Hand.
Marblehead Mining Company	Sugar Loaf		Sugar Loaf.
Mayflower	do		Do.
Missing Link	Gold Hill	Thomas Patrick	Gold Hill.
Mount Kesler Mining Company	do		Do.
Miners' Mutual Mining Company	Jamestown		Jamestown.
Mergi	do	Clements & Janeway.	Do.
Monitor	do	Wilson, Stanley & Co.	Do.
Moonstone	Sugar Loaf		Sugar Loaf.
Mammoth	Magnolia		Magnolia.
*Ni Wot	Ward		Ward.
*Native Silver	Sugar Loaf		Sugar Loaf.
*Nelson	Ward		Ward.
News Enterprise	Sugar Loaf		Sugar Loaf.
Nautilus	Grand Island		Caribou.
Niagara	Sugar Loaf	Sherman, Clements & Co.	Sugar Loaf.
New Mexico	Magnolia		Magnolia.
Napoleon	Gold Hill	Louis Koehler	Sunshine.
Ophir	Sugar Loaf		Sugar Loaf.
Osbourn Group	do		Do.
Ozark Tunnel Company	Gold Hill	David Mortimore	Sunshine.
Ocean Wave	Jamestown	Robert Peters, jr	Jamestown.
Orlando	do	George Du Bois	Do.
Orion	do	T. J. Lafferty	Do.
*Phillips Placer	Gold Hill	Ivers Phillips	Boulder.
*Prussian	do	—— Kirkbride	Gold Hill.
*Poorman	Grand Island	Colin McKenzie	Caribou.
*Potosi	Jamestown	James Hayes & Co	Jamestown.
Princess	do	Richard Ball & Co	Do.
Pet	do	Du Bois Bros	Do.
Pewabic	do	Walrod & Strock	Do.
Printer Boy	Sugar Loaf		Crisman.
*Pine Shade	do	Thomas Hendershot	Sugar Loaf.
Quintard	Gold Hill		Gold Hill.
*Red Cloud Mining Company	do		Do.
Rebecca Mining Company	do		Do.
Revenue	Sugar Loaf		Sugar Loaf.

List of mines in Colorado—Continued.

BOULDER COUNTY—Continued.

Name of mine.	District.	Owners or managers.	Post-office address.
Rip Van Dam	Sugar Loaf	F. L. Higby	Springdale.
Romance	Jamestown	Cyrus Taylor	Jamestown.
Roanoke	do		Do.
Rambler	do	Samuel Orr & Co	Do.
Reliance	do	Barkley, Sanders & Taylor.	Do.
Rattler	do		Do.
*Smuggler	Sugar Loaf	T. M. Moore	Sugar Loaf.
*Seven-thirty Mining Company	Grand Island		Caribou.
*Smoky Hill	Sugar Loaf		Sugar Loaf.
*Sugar Loaf Mining Company	do	Bryan Bliss	Do.
*Slide	do		Do.
*Santa la Saria Mining Company	Grand Island	Van Buskirk & Co	Caribou.
*St. Joe	Gold Hill		Gold Hill.
Seeley Mining Company	Magnolia		Magnolia.
*St. George	Gold Hill	Johnson & Smith	Sunshine.
St. Julian	Magnolia	A. E. Sherman	Ballarat.
Sterling	Gold Hill		Gold Hill.
Silver Star	Magnolia		Magnolia.
Santa Fé	Gold Hill		Gold Hill.
Sydney Group	Jamestown	Thomas H. Noland & Co.	Jamestown.
Standard	do	Evans & Peter	Do.
Song Bird	do	Reardon Bros	Do.
Stanislaus	do	A. & J. Campbell	Do.
Star	do		Do.
Silver Queen	do	G. B. Stanley & Co	Do.
Tenderfoot	Gold Hill		Gold Hill.
Tacleus	Sugar Loaf		Crisman.
Twin Blossoms	Jamestown	E. L. Miner	Jamestown.
Ten Forty	do	O. F. Whitford & Co.	Do.
*U. P	Magnolia		Magnolia.
*Vanchus	Sugar Loaf	G. R. Williams	Crisman.
*Victoria	Gold Hill		Gold Hill.
*Van Buren	do		Do.
*Vine	Sugar Loaf		Crisman.
Vulcan	Gold Hill		Gold Hill.
Volens	Jamestown	Mills, Carter & Co	Jamestown.
*Wolverine	Gold Hill		Sunshine.
*Wood & Germain Mining Company	Sugar Loaf	G. P. Wood	Sugar Loaf.
Winona Mining Company	Gold Hill	H. C. Harrison	Gold Hill.
Western Slope	do		Sunshine.
Wealth Group	Jamestown	Walrod & Strock	Jamestown.
Wild Cat	do	Clawson & Reardon	Do.
Wonder	Central	George Du Bois	Do.
*Yellow Pine	Sugar Loaf	G. R. Williams	Crisman.

CLEAR CREEK COUNTY.

Name of mine.	District.	Owners or managers.	Post-office address.
*Albro Mining Company	Dumont		Dumont.
*Amazon	Seaton Mountain	Jesse Gilmore	Idaho Springs.
*Alice Placer	Silver City	George Montgomery	Fall River.
Astor Silver Mining Company	Griffith		Georgetown.
Atlantic and Pacific Tunnel	Daily Range	Dr. McKenny	Do.
Asperanza	Brown Mountain		Do.
Astor	Democrat Mountain		Do.
Alps Silver Mining Company	do		Do.
*Arizona	Seaton Mountain	D. Williams	Idaho Springs.
*Aliunde No. 1 and 2	Independent Mountain.	John Turck	Georgetown.
*Ætna	Griffith	Hayward & Marsh	Do.
*Argo	Idaho	Rudberg & Elliott	Idaho Springs.
*Baltimore Mining and Tunnel Company	Griffith		Georgetown.
*Baxter Mining Company	do	John G. Roberts	Do.
*Backbone Mining Company	do		Do.
*Burleigh Mining Company	do		Do.
*Baker Silver Mining Company	do		Do.
*Black	Idaho	Black Bros	Idaho Springs.
*Belman	Virginia Cañon	J. McCubbin	Do.
*Black Bear	Spanish Bar	George Yingling	Do.
Bismarck	Sherman	George W. Cox	Georgetown.
Baker	West Argentine	Frank Rosengarten	Do.
Bonanza Tunnel	Democrat Mountain		Do.
Boston and Pittsburgh Mining Company	Daily Range		Empire.

List of mines in Colorado—Continued.

CLEAR CREEK COUNTY—Continued.

Name of mine.	District.	Owners or managers.	Post-office address.
Big Horn	Silver Creek	Thomas W. Lloyd	Lawson.
Bullion Tunnel	Griffith		Georgetown.
Beaver Gold and Silver Mining Company.	Idaho	J. W. Bigger	Idaho Springs.
Belle Tunnel	do	J. T. Bailey	Do
Burrell	Griffith	Capt. Phillips.	Georgetown.
Beloit	Empire		Empire.
Belmont	Argentine		Georgetown.
Black Hawk	do		Do.
Brooklyn	do		Do.
*Boon Ditch Tunnel		John Steele & Co	Do.
*Colorado Diamond Tunnel Company		John A. Fisk	Do.
*Colorado Central Consolidated Mining Company.	Griffith	G. W. Hall	Do.
*Consolidated Hercules and Roe Mining Company.	do	H. M. Griffin	Do.
*Consolidated United Mining Company	Brown Mountain		Do.
*Cincinnati Mining Company	Griffith	J. M. Graham	Do.
*Clear Creek Mining Company	do		Do.
*Cashier Mining Company	do	H. F. Swanson & Co.	Do.
*Consolidated Seaton Mountain Mining and Tunnel Company.	Seaton Mountain		Idaho Springs.
*Crystal	Virginia Cañon	William E. Sisty	Do.
*Clifford	Camp Clifford	H. M. Thompson & Co.	Clifford.
*Chicago	Chicago	Preston R. Plumb	Idaho Springs.
*Centennial	Hukill Gulch	Saumel Fabin.	Do.
*Claraissa	Virginia Cañon	William H. Bush	Do.
*Columbia	Lawson		Lawson.
*Champion	Belleview Mountain	—— Whitney	Idaho Springs.
*Champion	Trail Creek	Thomas Cooper	Do.
*Carbonate	Camp Clifford	C. W. Eyster	Clifford.
*Columbian Chief	Lawson		Lawson.
Consolidated Republican Mountain Mining Company.	Republican Mountain.		Georgetown.
Cliff	Democrat Mountain		Do.
Cashier	do		Do.
Chrysolite	Daily Range		Empire.
Cherokee	Republican Mountain.		Georgetown.
Charter Oak	Cascade		Do.
Comanche	do		Do.
Consolidated Syracuse Mining Company.	Dumont		Dumont.
Comet	Griffith		Georgetown.
Comstock	do		Do.
Cash	do		Do.
Columbus	do		Do.
Donaldson	Spring Gulch		Idaho Springs.
Dove's Nest	Seaton Hill		Do.
Dominion	do		Do.
Diamond Tunnel Gold and Silver Mining Company.	Griffith		Georgetown.
*Dunderburgh Mining Company	do	Andrew Stevens	Do.
Danedin	do	O. R. Old	Do.
Daniel Peters	Republican		Do.
Diamond Joe Extension	West Argentine		Do.
Daisy Silver	Daily Range	Czarnowsky & Watts	Silver Plume.
Davenport	Dumont		Dumont.
Dunkirk	Griffith		Georgetown.
*Equitable Mining Company	do	W. M. Fletcher	Do.
*Equator Silver Mining Company	do	H. S. Kearney	Do.
*Emma	do		Do.
*Edgar	do		Silver Plume.
*Eclipse	Cascade	Gibson & Co	Georgetown.
*Egan Tunnel Company	Griffith		Do.
*Empire City	Empire	W. M. Moore	Empire.
*European	Dumont		Dumont.
*Edgar	Hukill Gulch	C. H. Morris	Idaho Springs.
East Fenton	Brown Mountain		Georgetown.
East Cashier	Sherman Mountain		Do.
Elizabeth	Dumont		Dumont.
Eagle Extension	do		Do.
*Europe	do	A. Liftingwell & Co.	Do.
*East Mendota	Griffith	Chaffee & Co	Georgetown.
*Frostburgh Mining Company	do	R. O. Old	Do.
*Free American Mining Company	Lawson		Lawson.
*Free American Extension	do		Do.
*Freeland Mining Company	Freeland	F. F. Osbiston	Idaho Springs.
*Freeman	do		Do.

List of mines in Colorado—Continued.

CLEAR CREEK COUNTY—Continued.

Name of mine.	District.	Owners or managers.	Post-office address.
*Fred Rogers	Democrat		Georgetown.
*Fairmont and Shafter Gold and Silver Mining Company.	Hukill Gulch	J. C. McCuen	Idaho Springs.
*Freighters' Friend	Seaton Mountain	—— Parvin	Do.
Florence	Republican Mountain.	John G. Roberts	Georgetown.
Fletcher	Griffith		Do.
Foxhall	Idaho		Idaho Springs.
Flagstaff	Griffith		Georgetown.
Fourth of July	Seaton Mountain	T. H. Low	Idaho Springs.
*Florida	Saxon Mountain	Strausser & Parker	Georgetown.
*Financier	Cascade	Boswick & Co	Idaho Springs.
*Fulton	Griffith	R. O. Old	Georgetown.
*Good Luck Mining Company	Argentine		Do.
*Griffith	Griffith		Do.
*Garfield Tunnel Company	Republican Mountain.	Thomas W. Jones	Do.
*Gem	Idaho		Idaho Springs.
*Great Republic Mining Company	Upper Union	Thomas H. Bates	Empire.
*Great Eastern	Cascade	Doyle & Co	Georgetown.
*Garden	Seaton Mountain	J. F. Hull	Idaho Springs.
*Great American	Griffith	Curran Bros. & Coppard.	Georgetown.
*Gum Tree	Trail Creek	Israel Stotts	Idaho Springs.
*Golden Link	do	W. H. Dow	Do.
*Golden Leaf	Soda Creek	D. C. Barber	Do.
*Gladstone Gold and Silver Mining Company.	Spanish Bar		Do.
*Grand Army	Fall River	George Montgomery & Co.	Fall River.
*Gold Dirt	Empire	John Carter	Empire.
Gilpin	Daily Range		Georgetown.
George Peabody	Argentine		Do.
Gray Copper	Leavenworth		Do.
Geneva Consolidated Mining and Silver Company.	Montezuma		Do.
*Herman Mining Company	do		Do.
*Horn & Errickson Mining Company	Spanish Bar	Horn & Errickson	Idaho Springs.
*Hukill Gold and Silver Mining Company.	Hukill Gulch	A. F. Webster	Do.
*Hub	do		Do.
*Hercules and 37 Mining Company	Brown Mountain	H. M. Griffin	Georgetown.
*Hidden Treasure	Republican Mountain.		Do.
*Humboldt Mining Company	Ute Creek		Idaho Springs.
*Hyland	Spanish Bar	H. M. Thompson	Do.
*Hudson	Virginia Cañon	A. Noxan	Do.
*Hist	Griffith		Georgetown.
*Hoosac Tunnel and Mining Company	do	J. V. W. Vandenburgh.	Idaho Springs.
Herkimer	Daily Range		Georgetown.
Hood	Griffith Mountain	R. O. Old	Do.
*Independence	East Argentine	O. E. Clark	Do.
*Idaho Tunnel Company	Seaton		Idaho Springs.
*Invincible	Spring Gulch	J. P. Davis	Georgetown.
International	Griffith		Do.
*Idaho Belle	Idaho		Idaho Springs.
Illinois Central	Daily Range		Empire.
Idaho Springs Mining Company	Idaho		Idaho Springs.
*Isothermal	Leavenworth	Peter Bourquin & Co.	Silver Plume.
*Joe Reynolds Nos. 1, 2, and 3	Silver Creek	Joseph Reynolds	Lawson.
*Joe B	Camp Clifford		Clifford.
*Josie Meeker	West Argentine	John McLees	Georgetown.
Johnny Bull	Cascade		Do.
Jackson Mining Company	Griffith		Do.
Junction	do	Fohn & Co	Do.
*Kitty Clyde	Spring Gulch	—— Warren	Idaho Springs.
*Kirkley	Griffith	C. A. Martin	Georgetown.
*Kangaroo Mining Company	Freeland		Idaho Springs.
*Knickerbocker Mining Company	Daily Range		Georgetown.
*Kinda	Fall River	D. Green	Fall River.
Kohinoor	Dumont	A. Beemer	Dumont.
*Lebanon Tunnel and Mining Company	Griffith		Georgetown.
*Lincoln Silver Mining Company	do	W. A. Burr	Do.
*La Crosse	Silver Creek		Lawson.
*Little Mattie	Chicago Creek	J. V. W. Vandenburgh.	Idaho Springs.
*Lead Belt	Seaton Mountain	Jesse Gilmore	Do.

List of mines in Colorado—Continued.

CLEAR CREEK COUNTY—Continued.

Name of mine.	District.	Owners or managers.	Post-office address.
Luzerne	Seaton Mountain		Idaho Springs.
Lincoln	Spanish Bar		Do.
Lone Tree	Trail Creek	J. M. Dumont	Do.
Little Casino	Seaton Mountain	Wilson & Hall	Do.
Leviathan	Montezuma		Georgetown.
Louisiana	Sherman Mountain		Do.
*Little Emma	Democrat	—— McNulty	Do.
*Live Yankee	Lawson		Lawson.
*Liberty	Democrat	Mills & Parker	Georgetown,
*Mendota	Griffith	O. R. Old	Do.
*Matilda Fletcher	Democrat		Do
*Mansfield Mining and Milling Company	Dumont		Dumont.
*Muscovite	Cascade		Georgetown.
*Metropolitan	Seaton Mountain		Idaho Springs.
*Murray	do	William Moore	Do.
*Mattie	Chicago Creek		Do.
*Maud Monroe	do		Do.
*Milton	Montana		Dumont.
*Manhattan Mining Company	Freeland	L. A. Shearer	Idaho Springs.
*Mayflower	Spanish Bar	J. A. McEuen	Do.
*Maximilian	Chicago Creek	T. B. Bryant	Do.
*Mint	East Argentine	Harris & Bonn	Georgetown.
*Maud S	Douglass Mountain	Tyler, Hamill & Co.	Do.
*Mother Vein Mining Company	Griffith		Do.
Maine	Argentine		Do
Magnet	Griffith		Do.
Mena	do		Do.
Memphis	do		Do.
Monitor	Dumont	Vinson Green	Dumont.
Moss Mining Company	Freeland		Freeland.
Moore Mining and Smelting Company	Lawson		Lawson.
Montana	Montana		Dumont.
Monticello Tunnel and Mining Company	Dumont		Silver Plume.
Marshall Silver Mining Company	Griffith		Georgetown.
Mammoth Gulch Mining Company	do		Do.
McClelland	Leavenworth Mt	C. A. Martin	Do.
Muscovite	Democrat Mountain.		Do.
Mountain Ram	Daily Range		Empire.
Mountain King	Seaton		Idaho Springs
*Maple Leaf	Clifford	James Collins	Camp Clifford.
*Neath	Empire		Empire.
*Niagara	Chicago Spring Gulch.	J. S. Mead	Idaho Springs.
Nyanza	Democrat Mountain	—— Fillins	Georgetown.
Northeastern Stevens Mining Company	Daily Range	H. M Griffin	Do.
Narragansett Gold and Silver Mining Company.	Idaho	H. K. Colvin	Idaho Springs.
*Oro	Spanish Bar	C. D. Mills	Do.
Olympic	Republican Mount'n		Georgetown.
O. K	Leavenworth Mt		Do.
*Old Domingo	Hukill Gulch		Idaho Springs.
*Ohio	Griffith	—— Gilbert	Georgetown.
*Pay Rock Consolidated Mining Company.	do		Do.
*Pelican-Dives Mining Company	do	W. A. Duff	Do.
*Pelican Silver Mining Company	do		Do.
*Patten	Idaho		Idaho Springs.
*Pride of the West	Silver Creek		Lawson.
*Pine Shade	Seaton Mountain	William Felt	Idaho Springs.
P. T	Chicago Creek	Peter Thoebald	Do.
Princess	Belleview Mountain.	John Cullum	Do.
Park	Seaton Mountain	Griswold & Ellis	Do.
Phœnix	Griffith		Georgetown.
Prince Albert	do		Do.
Pickwick	do		Do.
Polar Star	do		Do.
Polybasite	Leavenworth		Do.
Pioneer Mining Company	do		Do.
*Plebeian	Columbia Mountain	George Dinsmore & Co.	Do.
*Red Elephant Mining Company	Red Elephant	Charles E. Bigelow	Do.
*Ranchman	Camp Clifford	H. M. Thompson	Clifford.
Rocky Mountain Tunnel	Leavenworth	W. B. McLain & Co	Georgetown.
R. S. Morrison	Daily Range		Empire.
Ruby	do		Do.
Richmond	West Argentine		Georgetown.
R. E. Lee	Camp Clifford		Clifford.
Rockwell	Griffith		Griffith.

List of mines in Colorado—Continued.

CLEAR CREEK COUNTY—Continued.

Name of mine.	District.	Owners or managers.	Post-office address.
Range Line	Dumont	Du Bois & Donally	Dumont.
* Stevens Silver Mining Company	Argentine		Georgetown.
* Shively	Brown Mountain		Do.
* Silver Plume Mining Company	Argentine		Do.
* Syndicate	Dumont	R. W. Knowles & Co.	Dumont.
* Silver Ring	Cascade	Bigelow & Co	Georgetown.
* Specie Payment	Belleview Mountain.		Idaho Springs.
* Seven-Twenty	Seaton Mountain	B. T. Wells	Do.
* Sylph	Virginia Cañon	Philip Mixsell	Do.
* Sterling Silver Mining Company	Republican Mt	John G. Roberts	Georgetown.
* Silver Ledge	Peru		Idaho Springs.
Star	Chicago Spring Gulch.	J. P. Chabane	Do.
Santa Fé	Seaton Mountain	R. S. Gibson	Do.
Seaton	do	T. H. Low	Do.
Snow Drift	Griffith		Georgetown.
Silver Mountain Mining Company	do		Do.
Silver Link	Republican Mt	Guinane & Gigey	Do.
Sweepstakes	Leavenworth Mt		Do.
Silver Belt	do		Do.
Saxon	Saxon Mountain		Do.
Summit	Saxon	Parker & Charles	Do.
Snowy Range	Daily Range	F. L. Cowley	Empire.
Saginaw Valley Mining Company	Dumont		Dumont.
Silver Queen	Griffith		Georgetown.
Stanley	do		Do.
Scotia	do		Do.
Silver Cloud	Upper Union		Do.
Savage	Griffith		Do.
South America	do		Do.
Square and Compass	do		Do.
Saco	do		Do.
Simpson Mining Company	do		Do.
Stratton	Freeland		Freeland.
* Silver Glance Mining Company	Griffith	—— Shepard	Georgetown.
* Terrible Mining Company	do		Do.
* Tropic	Seaton Mountain	Reynolds & Gilbert.	Idaho Springs.
* Telephone	Brown Mountain	Cantlon & Merrick	Georgetown.
Telegraph	Dumont	F. L. Downend	Dumont.
Tenth Legion	Empire		Empire.
* Unadilla Mining Company	Dumont		Dumont.
U. P. R	Fall River	Philip Mixsell	Fall River.
* United Tunnel	Kelso Mountain	W. F. Kelso	Georgetown.
* Vancouver	Camp Clifford	Julius Peytrenet	Clifford.
* Victor	Idaho		Idaho Springs.
* Veto	Seaton Mountain	R. H. Gibson	Do.
* Victor Silver Mining Company	Seaton	M. S. Claypool	Georgetown.
Vesper	Argentine		Do.
Vulcan	Republican Mt	Pollard & Myers Bros.	Do.
* White	Argentine	J. T. Harris	Silver Plume.
* White Cloud	Virginia Cañon	Dr. Paul	Idaho Springs.
White	Lawson		Lawson.
Western Union Mining Company	Dumont	F. L. Downend	Dumont.
Wide West	Leavenworth Mt	Augustus Blackman	Georgetown.
Wheeling	East Argentine	J. B. Johnson	Do.
White Pine	Democrat Mountain.		Do.
Wide Awake Tunnel and Mining Company.	Argentine	W. A. Hamill	Do.
* Yellow Jacket	Camp Clifford.		Clifford.

CHAFFEE COUNTY.

Alpine Silver Mining Company	Chalk Creek		Alpine.
Abbott Mining and Milling Company	La Plata		Vicksburg.
Absolute	do		Springdale
Allie Bell	Chalk Creek		Hancock.
Auretta	do	T. J. Hampson	Garfield.
* Black Tiger	do	J. W. Hanna	Do.
* Brittenstine Mining Company	do		Alpine.
* Black Prince Mining Company	do	C. H. Schwartz	Garfield.
* Baraconta	La Plata	Logan & Garbutt	Winfield.
Boss Tweed	Chalk Creek	McClure & Lines Bros.	Alpine.
Bridgeman	do		Do.
Bonnie Bell	do		Garfield.

List of mines in Colorado—Continued.

CHAFFEE COUNTY—Continued.

Name of mine.	District.	Owners or managers.	Post-office address.
Ben. Hill	Chalk Creek		Garfield.
Brittle Silver	do		Saint Elmo.
Belle Fontaine	Cottonwood		Salida.
Big Four Mining Company	Chalk Creek	A. Bryan	Courow.
Big Pittsburgh	do		Alpine.
Baal Beck	do		do.
Big Smoke	do		Saint Elmo.
*Columbus Mining Company	do	George K. Sabin	Garfield.
*Chrysolite Mining and Smelting Company	do	J. T. Wilson	Saint Elmo.
*Charm	do		Maysville.
*Crœsus	Beaver City	Vinette & Phillips	Beaver City.
Copper	Chalk Creek		Alpine.
Commonwealth Tunnel Company	do		do.
Chaffee	do		Garfield.
Columbus and Sun Prairie Mining Company	do		Alpine.
Continental Divide	do		Garfield.
Cigins	do		Saint Elmo.
*Diamond Queen	do	J. T. Redman	do.
Desdamonia	do		Garfield.
Denver	do		do.
Defiance Mining Company	do	H. Altman	Maysville.
Decorah	do		Alpine.
Dan Allen	do	A. J. Keifner	Hancock.
Dillon	do		do.
*Eclipse	do	C. H. Abbott	Garfield.
*Erie Consolidated Mining and Smelting Company.	do	G. W. Jones	Maysville.
Edith	do		Hancock.
Emory	do		Alpine.
Eagle Bird	do		Garfield.
Empire	do		Saint Elmo.
El Dorado Gold and Silver Mining Company.	do	H. A. Henry	Do.
Esperanza	La Plata		Hortense.
Evening Star	Chalk Creek		Alpine.
*Free Gold Consolidated Mining Company	Cottonwood	S. Alsop, jr.	Free Gold.
*Flora Bell	Chalk Creek		Hancock.
*Fairplay	do		Chaffee.
Fall River and Pittsburgh Mining Company	Cottonwood		Divide.
Flagstaff	La Plata	Cunningham & Co	Pine Creek.
Franklin	Chalk Creek		Hancock.
*Forest Rock	Cottonwood	Huff, Jones & Smith	Free Gold.
*Francis L	Chalk Creek		Hancock.
*Guthrie	Mount Princeton	Weber, Wells & Co.	Cottonwood.
*Gaff Mining Company	La Plata	W. H. Jones	Granite.
*Granite Consolidated Mining Company	do	Ch. Barreh	Do.
*Gladstone	Cottonwood	Byrnes, Baker & Hurd.	Cottonwood.
*Golconda Placer	Chalk Creek	A. B. Chaplan	Salida.
*Gold Nugget Placer	do	W. W. Roller	Do.
Green's Gulch Gold and Silver Mining Company.	do	Walter Oakley	Maysville.
Glen Cove Mining Company	La Plata	D. H. Somers	Vicksburg.
Gunshot	Chalk Creek		Garfield.
Greyhound	do		Hancock.
Germania	do		Do.
*Hortense	La Plata	Eugene Seats	Hortense.
*Harrison Tunnel Company	Chalk Creek		Saint Elmo.
Hawley	Cottonwood		Cottonwood.
Herrick Mining Company	do	Henry H. Aeker	Do.
Hyde Park	La Plata	Stull, Hoag & Co	Pine Creek.
*Iron Chest	Chalk Creek	Davies & Hudgins	Saint Elmo.
*Iron City Mining and Smelting Company.	do		Do.
*I. X. L	La Plata	O. Kirsch & Co	Vicksburg.
Indianapolis	Chalk Creek		Garfield.
Irma Group	do	T. R. Higgins	Alpine.
Iron Chest	Cottonwood	Joseph Newitt	Divide.
Jay Gould Mining Company	Chalk Creek		Alpine.
Josephine Mining and Tunnel Company	do	W. B. Biddle	Do.
Jack of Clubs	do	J. Gilligan & Co	Do.
*Kentucky	Mineral Hill	A. B. Steinberger	Hancock.
*Kansas City Mining Company	Chalk Creek	J. A. J. Chapman	Alpine.
Kismet Consolidated Mining and Milling Company.	do		Poncha Springs.

List of mines in Colorado—Continued.

CHAFFEE COUNTY—Continued.

Name of mine.	District.	Owners or managers.	Post-office address.
*Lake County Placer Mining Company	La Plata	T. F. Van **W**agenen	Granite.
*Little Charm	Chalk Creek		Chaffee.
*Little Nell	Sugar Loaf Mountain	Geo. W. Saster	Saint Elmo.
Lehigh	Lehigh Mountain	Roder, Ray & Thomas.	Alpine.
Lexington	Chalk Creek	P. A. Snell	Chaffee.
Lake View Tunnel Company	do	J. D. McClosky	Saint Elmo.
Leeds Mountain Gold and Silver Mining Company.	do	Wm. C. Gibbons	Maysville.
Lost Wonder	do		Garfield.
Levy Mining Company	La Plata		Hortense.
Livingston	Chalk Creek	Geo. L. Smith	Alpine.
Lone Star	do	Baker Bros. & Co	Hancock.
Little Carrie	La Plata	F. H. Wray	Vicksburg.
*Monarch Mining Company	Monarch Mountain	Robt. J. Clark	Garfield.
*Murphy Mining Company	Chrysolite Mountain	John G Kelley	Saint Elmo.
*Mollie	Chalk Creek	La Grave & Valle	Alpine.
*Madonna Mining Company	do	Gen. Tuttle	Garfield.
*Mountain Chief	do		Do.
*Madeline No. 2	Chalk Creek	Berry, Runner & Co	Alpine.
Mammoth Tunnel Company	do	A. V. Hunter & Co	Saint Elmo.
Mountaineer Mining Company	do		Garfield.
Mechanics Mining Company	La Plata		Vicksburg.
Metropolitan Mining Company	Chalk Creek		Alpine.
Monarch Co-operative Mining Company	do		Conrow.
Monarch Syndicate Mining Company	do		Maysville.
Moonstone	La Plata		Hortense.
Maysville Pioneer Mining Company	Chalk Creek	W. W. Wood	Maysville.
Monticello	do	A. W. Harrington	Garfield.
Madison	do		Alpine.
Mineral Point	do		Do.
Marquis of Lorne	do	W. B. Biddle	Do.
Minnetonka	do		Do.
Michigan	do	Mather. Quick & Co	Garfield.
North Fork Consolidated Mining Company.	do	—— Billen	Poncha Springs.
Old Dog Tray	do		Hancock.
Oskosh	do	Jas. B. True	Chaffee.
Oklahoma	do		Hancock.
Occidental	do		Do.
*Paymaster	Monarch Mountain		Maysville.
*Rarus and Warrior Consolidated Mining Company.	Chalk Creek	R. J. Coleman	Hancock.
Richman	do		Alpine.
Rainbow	do		Garfield.
*Stonewall	Mineral Hill	Adair & Halsey	Hancock.
*Stanley	Chalk Creek	Lewis, Davis & Co	Saint Elmo.
Silverdale Mining Company	La Plata	F. H. Wray	Vicksburg.
Silver Seal Mining Company	Chalk Creek		Alpine.
Silver King	La Plata	States, Evans & Co	Pine Creek.
Stockholm	Chalk Creek		Hancock.
Salida Mining and Milling Company	Cottonwood		Salida.
Shively	Chalk Creek		Saint Elmo.
Stevens	do		Do.
Saint Elmo Gold and Silver Mining Comp'y	do	J. A. Morlan	Do.
Schuyler Mining Company	do	A. J. Byrns	Do.
Song Bird	do		Garfield.
Saturn	do		Hancock.
Sitting Bull	do	W. L. & A. D. Pennington.	Alpine.
Silent Friend	do	Capt. Harrington & Co.	Garfield.
*Tressa C	do		Saint Elmo.
*Tilden	do		Chaffee.
U. S. Treasury	do		Alpine.
U. S. Mint	do	Ireland, Nelson & Co.	Do.
Uncle Sam	do	Mount Ætna Gold and Silver Mining Company.	Garfield.
Union Mining and Milling Company	do	G. W. Davy	Maysville.
William Mathewson	do		Alpine.
Wallach	do		Garfield
*Yale Mountain Mining and Milling Company.	Cottonwood	Charles Robbie	Cottonwood.
*Young American Placer Mining Company	La Plata	T. F. Van Wagenen	Granite.
*Yellow Rose	Chalk Creek	W. S. King	Alpine.
*Yellow Stone	do		Do.

List of mines in Colorado—Continued.

CUSTER COUNTY.

Name of mine.	District.	Owners or managers.	Post-office address.
*Ben Franklin	Silver Cliff		Silver Cliff.
*Bull Domingo Mining Company	do	N. B. Stevens	Do.
*Bassick Mining Company	Hard Scrabble	W. F. Van Pett	Bassickville.
*Boulder and Buffalo Hunter Mining Company.	Silver Cliff		Silver Cliff.
Black Eagle Mining Company	do		Do.
Banner	do		Do.
Belle	do		Do.
Blue Nose	Hard Scrabble		Clinton.
*Colorado Springs and Silver Cliffs Mining Company.	Silver Cliff		Silver Cliff.
*Comargo	do		Do.
*Consolidated Nebraska Mining Company	Hard Scrabble		Rosita.
*Custer County Tunnel Company	Silver Cliff		Silver Cliff.
*Comstock	do	T. A. Armstrong	Do.
Crescent Mining Company	do	T. D. Hammond	Do.
Chloride	do		Do.
Colorado Dirigo Mining Company	do	D. K. Cross	Do.
Colorado and Portage Mining Company	do		Do.
Caliparmo	Hard Scrabble		Rosita.
*Dirigo Mining Company	Silver Cliff	D. K. Cross	Silver Cliff.
Del Norte	do		Do.
Darby	Hard Scrabble		Clinton.
Diadem	Silver Cliff		Silver Cliff.
*Elematah	Hard Scrabble		Rosita.
*Eureka	Silver Cliff	W. H. Husband	Do.
Eagle Mining and Milling Company	Hard Scrabble		Do.
Empire Gold and Silver Mining Company	Silver Cliff		Silver Cliff.
Fiskdale	do	L. W. Beck	Do.
*Game Ridge Consolidated Mining Company.	Hard Scrabble	L. M. Cooper	Rosita.
Gold Star	Quartz Creek		Silver Cliff.
Galveston and Colorado Mining Company	Silver Cliff		Do.
Gold Prize Mining Company	do		Do.
*Horn Silver	Silver Cliff		Do.
*Humboldt	do		Do.
*Hector	Hard Scrabble		Rosita.
*Horton Mining Company	do		Do.
*Huruhalt	Silver Cliff		Silver Cliff.
Haverly Invincible Mining Company	do	M. H. Hushman	Do.
Hawkeye Mining Company	do		Do.
Hecla	do		Do.
Hayden Mining Company	Hard Scrabble	Anthony Baker	Rosita.
*Invincible	Silver Cliff	W. H. Husband	Do.
*Julianna Lode Mining Company	do		
John Haud	Caroline Cañon		Rosita.
Kate	Silver Cliff	F. C. Darl	Silver Cliff.
Kansas Mining Company	do		Do.
*Leviathan Mining Company	Hard Scrabble	R. N. Daniels	Rosita.
*Little Maud	do		Clinton.
*La Crosse and Silver Cliff Mining Company.	Silver Cliff		Silver Cliff.
*Lucille Consolidated Mining Company	Hard Scrabble	V. B. Hoyt	Rosita.
*Leavenworth	do	E. W. Mathews	Do.
*Lumber City and Silver Cliff Mining Company.	do		Clinton.
Lipot and Saint Louis Mining Company	Silver Cliff		Dora.
Lady Franklin Mining Company	do	George W. Bowler	Silver Cliff.
Lone Star	do	J. O. Voorhees	Do.
*Memphis and Silver Cliff Mining Company.	do		Do.
Montour Mining and Milling Company	do	W. P. Alexander	Do.
Mountain View	do	C. W. Barry	Do.
Mapleton Mining Company	do	M. H. Parsons	Do.
*O. K	do		Do.
*Ophir Consolidated Mining Company	do		Do.
*Ocean Wave Mining Company	Hard Scrabble		Rosita.
*Pocahontas	do	M. M. Kellogg	Do.
*Polonia	do		Do.
*Paywell	do		Do.
*Palamia	Silver Cliff		Silver Cliff.
Plata Verde Mining Company	do	F. G. Faxon	Do.
Pennsylvania Mining Company	Hard Scrabble		Rosita.
Plata Piedra Mining Company	Silver Cliff	George L. Patrick	Silver Cliff.
*Queen City	do	Isaac Mears	Dora.
*Quaker City	Hard Scrabble	James Fitzgerald	Rosita.
*Rosita Mining Company	do		Do.

List of mines in Colorado—Continued.

CUSTER COUNTY—Continued.

Name of mine.	District.	Owners or managers.	Post-office address.
Ruby Consolidated Mining Company	Silver Cliff	M. F. Armstrong	Silver Cliff.
*Song Bird Consolidated Mining Company	do	J. W. McMillan	Do.
*Silver Park	do		Do.
*Silver Prize	do		Do.
*Silver Run Tunnel and Mining Company	do	Edwin J. Haskell	Do.
*Star	Hard Scrabble		Rosita.
*Silver Coin	do		Do.
*Silver Cliff Mining Company	Silver Cliff	John A. Thaxton	Silver Cliff.
*Saint Joseph and Silver Cliff Mining Company.	do	J. O. Lawden	Do.
Sarane Mining Company	do	M. H. Parsons	Do.
Springfield and Silver Cliff Mining Company.	do		Do.
Twenty-six	Hard Scrabble	Rump & Smith	Rosita.
Tellurium Mining and Milling Company	Silver Cliff	F. R. Wing	Silver Cliff.
Tebo	Hard Scrabble	R. A. Lair	Clinton.
Texas Camp	Silver Cliff		Dora.
Union Consolidated Mining Company	do		Silver Cliff.
*Valley City Mining Company	Hard Scrabble	J. B. Gilbert	Rosita.
*Woodward Mining and Smelting Company.	Silver Cliff		Silver Cliff.

COSTILLA COUNTY.

Mosco			Zapato.
Saratoga Mining Company			Russell.

DOLORES COUNTY.

Alta	Rico		Rico.
Atlantic Cable	do		Do.
Ætna	do		Do.
Ah Joyey	do	D. F. Taylor & Co.	Do.
Alleghany	do		Do.
Aztec	do	O. P. Gheist	Do.
*Black Demon	do		Do.
*Black Hawk	do	John Glasgow & Co.	Do.
*Bancroft	do		Do.
Black Bird	do		Do.
Big Casino	do		Do.
Blue Cloud	do		Do.
*Carbonate	do	Rische & Co	Do.
Camp Bird	do		Do.
Caribou	do		Do.
Cross	do		Do.
Coal	do		Do.
Chicago Tunnel	do	W. H. Bean	Do.
Cincinnati Mining Company	do		Do.
Dolores Valley Mining Company	do	C. O. French	Do.
Dawn of Day	do	Jos. Meredith	Do.
Dolores Mining Association	do		Bo.
Dolores Consolidated Mining Company	do		Do.
Ella	do		Do.
Eliza Jane	do	K. T. Rodigan	Do.
Fort Wayne	do		Do.
Florence	do	F. L. Downs	Do.
Flying Fish	do		Do.
Falcon	do		Do.
*Grand View Mining Company	do	John C. Grierson	Do.
*Grand Duke	do	Jos. Meredith	Do.
General Logan	do	Louis Haberman	Do.
General McPherson	do	McPherson & Co	Do.
Garibaldi	do		Do.
Golden Fleece	do	Summa Roe & Co	Do.
*Hope and Cross Mining Company	do		Do.
Horse Creek Mining Company	do	R. Puydam	Do.
Hog Back	do		Do.
Hawkeye State	do		Do.
Hermosa Mining Association	do	C. W. Cox	Do.
Iron Clad	do		Do.
*Johnnie Bull Mining Company	do	W. S. Hull	Do.
*Lelia Davis	do	E. S. Davis	Do.

List of mines in Colorado—Continued.

DOLORES COUNTY—Continued.

Name of mine.	District.	Owners or managers.	Post-office address.
* Little Maggie	Rico	H. S. Scott	Rico.
Lulu	do		Do.
Little Emma	do		Do.
Little Hattie	do		Do.
Little Carrie	do		Do.
Little Johnnie Mining Company	do		Do.
* Marrs Consolidated Mining Company	do		Do.
* Maggie	do		Do.
Mammoth Leadville	do		Do.
Mountain Boy	do		Do.
Mountain View	do	J. W. Winkfield & Co	Do.
Mable Gray	do		Do.
Melonia	do		Do.
* Newman Group	do	Fred. Reed	Do.
Nora Lillie	do		Do.
New Year	do	D. F. Taylor & Co	Do.
Nettie	do		Do.
North Star	do		Do.
* Puzzle	do	W. H. Bennett	Do.
* Puzzle Extension	do	Ed. P. Suydam	Do.
* Parole	do	H. J. Cadwell & Co	Do.
Parsons	do		Do.
Paymaster Mining Company	do	E. P. Suydam	Do.
Pomeroy	do		Do.
Pittsburgh	do		Do.
Pigeon	do	J. W. Winkfield & Co	Do.
Petzite	do		Do.
Rico	do		Do.
Rico No. 2	do	Summa Roe & Co	Do.
Rico Mining Company	do		Do.
Rico Carbonate Tunnel and Mining Company.	do	W. H. Bean	Do.
Rico Mountain Mining Company	do		Do.
Rico Pioneer Mining Company	do		Do.
Rico Silver Mining Company	do	S. H. Burghardt	Do.
Roundup	do		Do.
R. E. Lee	do		Do.
* Santa Clara Mining Company	do	X. W. Culbertson	Do.
Saint Louis	do		Do.
Sundown	do		Do.
South Park	do		Do.
Silver Wing	do		Do.
Stevens	do		Do.
Sparkling Jack	do		Do.
Uncle Ned	do		Do.
Victoria	do		Do.
* Wabash Consolidated Mining Company	do	H. B. Jenkins	Do.
Wallshat	do		Do.
Wizard	do		Do.
Zona K	do	A. McKensey	Do.

GILPIN COUNTY.

Name of mine.	District.	Owners or managers.	Post-office address.
Arrighi Mining Company		L. P. Arrighi	Central City.
* Arctic	Enterprise	Jas. A. Gilmore	Do.
* Ayres Mining Company			Do.
* Alps Mackey			Do.
* Arizona		E. W. Williams & Co.	Do.
* Americus	Bobtail Hill	H. Peterson	Do.
After Supper	Enterprise	Dick De Com & Bitzen.	Do.
Alaska		P. R. Smith	Do.
Anglo Celt			Do.
American Flag			Do.
Aurora Gold Mining and Milling Company.		J. H. Bowen	Do.
Alger Kansas Gold Mining Company		Jos. B. Hafer	Do.
Agra		A. N. Rogers	Do.
Ashtabula			Black Hawk.
* Bull of the Woods		Jos. B. Hafer	Central City.
* Burroughs			Do.
* Bobtail Consolidated Mining Company		A. N. Rogers	Do.
* Bonanza and Union Tunnel Company		Thos. H. Becker	Do.
* Boss No. 2		Hal. Saye	Do.
* Belden Tunnel Company		Thos. H. Becker	Do.
* Billings		W. A. Davis	Do.

List of mines in Colorado—Continued.

GILPIN COUNTY—Continued.

Name of mine.	District.	Owners or managers.	Post-office address.
* Bloodsoe		Truan, Nickols & Co	Central City.
Becky Sharp		Thos. Manning	Do.
Buell		F. H. Patton	Do.
Bates-Hunter Consolidated Mining Company.			Do.
Bates			Do.
Bald Eagle Gold Mining Company		W. W. Flagg	Do.
Bench		Ed. Truscott & Co	Do.
Bouvier		Smith & Stark	Do.
Bennett Kansas		Samuel V. Newell	Do.
Branch		A. Bitzenhofen	Do.
* Cottage	Nevadaville	Albro & Knight	Nevadaville.
* California Mining Company	do	Jos. Stanley	Do.
* Clifford		Emmet Rockwell	Central City.
* Columbia Mining Company		Thomas Seasy	Do.
* Cyclops	Enterprise	S. W. Tyler	Do.
* Central City Gold and Silver Mining Company.		Thos. H. Bates	Do.
* Cameron Consolidated Mining Company		W. D. Cameron	Do.
* Columbus		Jas. Frazer	Do.
Cashier Mining Company		Peter French	Do.
Centennial Tunnel Company		E. Goldman	Do.
Chemung		T. W. Potter	Do.
Can		S. C. Snider	Black Hawk.
Caledonia		I. J. McKay	Central City.
Canandaigua		J. E. Scoby	Do.
Champion		Thos. I. Richman	Do.
Clarissa		Wm. H. Bush	Do.
Colorado Chief	Enterprise	V. W. Tiffany	Do.
Cotton	Bobtail Hill	Thos. Hampton & Co	Do.
Cooper		—— Cooper	Do.
*Decatur Mining Company		W. L. Flagler	Do.
*Dutchman		S. W. Tyler	Do.
*Dallas Gold Mining Company		Sam. Smith & Co	Black Hawk.
Denmark	Enterprise		Central City.
Des Moines			Do.
Defiance Gold Mining Company			Do.
Dillon Mining Company			Do.
*Egpytian		Bonner, McFarlain & Co.	Do.
*Eagle		Hal. Saye	Do.
*Emmett		De Grass Salisbury	Black Hawk.
*East Flack	Bald Mountain	Sparks and Tueke	Bald Mountain.
Emerson		W. W. Flagg	Central City.
Empress		J. W. Holman	Do.
Emerald		Patrick Hughes	Do.
Empire Mining and Milling Company			Do.
*Freiburgh		S. W. Tyler	Do.
*Fourth of July	Nevadaville	Herbert Waterman	Do.
*Flack	do		Do.
Fanny	Enterprise	S. W. Tyler	Do.
Fiske	do		Do.
Fairfield		Judge M. Kline	Do.
Franklin			Do.
Forget-Me-Not		Sparks & Thompson	Do.
First Centennial		Robt. S. Haight	Black Hawk.
*Golden Flint		John Best	Central City.
*Golden Age		J. W. Holman	Do.
*Gilpin County Mining Company		K. G. Cooper	Do.
*Great Republic		A. N. Rogers	Do.
*Gunnell Mining Company		Wm. Fullerton	Do.
*German Tunnel Company		—— Carstens	Do.
*Golden Fleece		A. G. Elliott	Do.
*Great Monmouth		Hensen, Marr & Co., lessees.	Do.
Gauntlet		Jesse McLene	Do.
Gettysburgh		Jos. B. Hafer	Do.
Gold Coin Mining Company			Do.
Grizzly	Russell	E. T. Carr	Do.
Golden Wing	do	E. W. Williams	Do.
Galena		Paul Luistrom	Do.
*Hal Saye Mining Company		Hal Saye	Do.
*Hidden Treasure Mining Company		Samuel V. Newell	Do.
*Hard Money		B. H. Locke	Do.
*Hazletine Mining Company		J. B. Mellor	Do.
*Hawley Gardner	Nevadaville		Nevadaville.
Hubert Mining Company			Do.

List of mines in Colorado—Continued.

GILPIN COUNTY—Continued.

Name of mine.	District.	Owners or managers.	Post-office address.
Hardesty			Central City.
Harkaway Mining Company		W. A. Davis	Central City.
Hope		John Tierney	Do.
Horsefall			Do.
*Illinois		Wm. Fullerton	Do.
*Jones	Bald Mountain	A. G. Derby	Bald Mountain.
*Justice	Lake	Bailey, Agnew & Co.	Central City.
*Jenny Linn	York Gulch	W. D. Young & Co.	Do.
James Henry		S. W. Tyler	Do.
Jones-Walter			Do.
*Kent County	Nevadaville		Nevadaville.
*Kansas Consolidated Mining Company	Bald Mountain	Frank S. Cravan	Bald Mountain.
*King Mining Company		O. F. Whitaker	Central City.
Kirk	Nevadaville		Nevadaville.
Kimber		Wm. Fullerton	Central City.
King of the Ranch		Sparks & Thompson	Do.
Kingston			Do.
Keystone		Bonden & Co., lessees.	Do.
*La Crosse		F. H. Messinger	Do.
*Leavenworth	Russell	D. J. McKay	Do.
*Little Bobtail Group		J. H. Bowen	Do.
Lewis		Wm. H Bush	Do.
Lucerne		B. H. Locke	Do.
Leavitt		T. W. Potter	Do.
Lindon Castle		J. H. Reid	Do.
Lillie Blanch	Enterprise		Do
Liberty Center Mining Company			Do.
Lady Washington			Black Hawk.
*Maryland			Central City.
*Missouri		Henry Paul	Do.
*Mary Graham		S. W. Tyler	Do.
*Manitoba	Vermillion	Helmick & Co	Do.
*Margaret Glennan		J. H. Reid	Do.
*McKay-Leavenworth	Russell	McKay & Co	Do.
*Mackey-Burroughs	Nevadaville	Richard Mackey	Nevadaville.
*Midas Mining and Milling Company	Quartz Valley	—— Collins	Central City.
Mascot		Furnald, Ellery & Co.	Do.
Morning Star		J. S. Updegraph	Do.
Mollie Sparks	Bobtail Hill	John Reilley & Co	Do.
*New York and Colorado Mining Company.		B. F. Wells	Do.
Nimrod		H. J. Hawley	Do.
Nonantum Mining Company			Do.
Nottaway Mining Company		John Best	Do.
Newfoundland		Benj. F. Pease	Do.
North Fairfield		Michael Kline	Do.
O. K			Do.
Oakland Mining and Milling Company			Do.
Orahood		—— McGruder	Do.
*Pleasant View Mining Company		John Best	Do.
*Pewabic		A. N. Rogers	Do.
*Powers		Paul Truscott & Co.	Do.
*Pyrennees	Quartz Hill	John Edwards	Do.
*Perigo	Rollingsville	Geo. W. Bennett	Rollingsville.
*Prize	Nevadaville	J. W. Bostwick	Nevadaville.
*Post Hole	do	Richard Mackey	Do.
Perrin Gold Mining Company		T. W. Potter	Central City.
Phonograph		Smith & Stark	Do.
Phœnix-Burroughs		Geo. E. Randolph	Do.
Pizarro	Nevadaville		Nevadaville.
Prompt Pay	Russell	Samuel Smith	Central City.
*Quartz Hill Consolidated Mining Company.	Quartz Hill	F. S. Craven	Do.
*Rialto		M. Mullen	Do.
*Rough and Ready		E. W. Henderson	Do.
*Rhoderic Dhu	Quartz Hill	do	Do.
*Rara Avis Mining Company	Eureka	H. H. Boucher	Do.
*R. H. D		David Jenkins	Do.
*Rollings Gold and Silver Mining Company.	Independent	Geo. W. Barrett	Do.
Red Cloud			Do.
Register Call		Laird, Marlow & Co	Do.
Richardson		—— Schenk	Do.
Rose and Plume			Do.

List of mines in Colorado—Continued.

GILPIN COUNTY—Continued.

Name of mine.	District.	Owners or managers.	Post-office address.
Running		Horace Humphrey	Central City.
Russell District Gold and Silver Mining Company.		Thos. Wilson	Do.
Ranchman			Do.
Ralls County	Nevadaville	D. S. Grune	Do.
*Saratoga	Russell	S. I. Lorah & Co	Do.
*Saint Louis		F. Kilbourne	Do.
*Star of the Mountains		Hatch & Schaffer	Do.
*Swamp Angel	York	Jas. Collins	Do.
*Scandia		Thos. H. Bates	Do.
*Silver Dollar	Russell	Chas. Hasker	Do.
Susquehanna		F. H. Messinger	Do.
Stub-Tail		John G. Hatch	Do.
Specie Payment Mining Company	Russell	M. A. Lathrop	Do.
Sleepy Hollow	Enterprise		Do.
Saint Clair		Judge Klein	Do.
Sugar Teat		A. W. Locke	Do.
Shamrock		J. P. Agnew	Do.
Silver King Gold and Silver Mining Company.			Do.
*Toronto	Hughesville	J. W. Dripps	Do.
Topeka		Geo. E. Randolph	Do.
Trio		F. Hardy	Do.
Telephone		Smith & Stark	Do.
Telegraph		do	Do.
Trust Kansas		J. H. Thatcher	Do.
Trust Gold Mining Company			Do.
*United Gregory Gold and Silver Mining Company.		T. G. Nagle	Black Hawk.
*Unexpected	Lake	Hal Saye	Central City.
*Valley View Mining and Milling Company.		J. H. Bowen	Do.
*Veto	Gilson's Gulch	J. S. Updegraph	Do.
*Winnebago			Do.
*White Cloud	Russell	Henry Paul	Do.
*Williams	Lake		Do.
*Wheeler Tunnel Silver Mining Company.			Do.
*Wyandotte Consolidated Mining Company.	Russell	B. A. Farnham	Do.
Washington	Lake	J. W. Holman	Do.
West Gregory	Packard Gulch	Flynn Bros. & Co	Do.
Wilber		E. K. Baxter	Do.
Web Foot		Samuel Lucky	Do.
War Dance		Thos. Wilson	Do.
Whitney	Eureka	H. H. Becker	Do.
Wyomed		Laird, Marlow & Co	Do.
Wayne			Black Hawk

GRAND COUNTY.

Bank of England			Lulu.
Colorado and Kentucky Mining Company.			Gaskell.
Crystal		Ruggles and Christie	Teller.
Gaslight Mining Company			Do.
Grand Lake Mining Company		E. P. Weber	Do.
Lucky		W. H. Germain	Do.
Monumental		Dempsey & Custer	Do.
North Park and Vandalia Mining and Smelting Company.		D. C. Holcomb	Do.
Rocky Mountain Mining and Smelting Company.		M. C. Brown	Do.
Smoky City		D. S. Latham & Co	Do.
Wolverine		Le Fever Bros	Do.

FREMONT COUNTY.

*Cotopaxi	Cotopaxi	E. H. Saltiel	Cotopaxi.
*Gem	Titusville	John C. Lawdon	Do.
Grand Central Tunnel Mining Company.	Hayden Pass	H. A. Silsby	Cañon City.

List of mines in Colorado—Continued.

FREMONT COUNTY—Continued.

Name of mine.	District.	Owners or managers.	Post-office address.
Horseshoe	Soda Springs		Cotopaxi.
Lookout	Titusville		Do.
* Saltiel Group	Cotopaxi	E. H. Saltiel	Do.
Tip Top	Hayden Pass		Do.

GUNNISON COUNTY.

* Annie Derica	Tin Cup		Tin Cup.
* Alwilda	Tomichi		White Pine.
Annie B	Tin Cup	C. S. Nichols	Tin Cup.
Annie D	do	do	Do.
*Addie C	do	do	Do.
Alps Silver Mining Company	Tomichi		White Pine.
Anna Mountain Mining and Smelting Company.	Ruby		Irwin.
Anna's Treasure	Tin Cup	Thos. Goodman	Tin Cup.
Amboy	do	J. C. Taylor	Do.
* Bergen King	Ruby		Irwin.
* Buffalo	Rock Creek	Thos. Shideler & Co.	Elko.
* Blue Bird	Quartz Creek		Ohio City.
* Broadus	do	C. C. Broadus & Co	Pitkin.
* Burlington	Ruby	Dunn & Maloney	Irwin.
* Bullion King	do	Ropell	Do.
* Bill Short	Tomichi	J. J. Thomas	Tomichi.
* Bullion	Elk	Crater, Clayton & Co.	Gothic.
* Big Galena	Tin Cup		Tin Cup.
* Bertha Gulch Placer	do		Do.
* Billy Babbitt	Quartz Creek	Babbitt, Slaven & Co.	Pitkin.
Badger	Tin Cup	Nathan Fawcett	Tin Cup.
Buster	Quartz Creek		Pitkin.
Big Casino	do	Dempsey & Co	Do.
Bertha	do		Do.
Brittle Silver	do	A. Falco	Do.
Bullion King	do		Do.
Bonanza	Tin Cup		Tin Cup.
Belmont Mining Company	Slate River		Crested Buttes.
* Consolidated Vanderbilt Mining Company.	Elk	S. M. Butler	Scofield.
* Central Mining and Milling Company	Rock Creek	J. M. Schommaker	Elko.
* Cumberland	Quartz Creek	Packard & Johnson	Pitkin.
* Celestial	do	Heastead & Co	Do.
Chicago	do		Do.
Cyclops	Tin Cup		Tin Cup.
Chicago	Tomichi		White Pine.
Contact	do		Do.
Cincinnati	Quartz Creek		Pitkin.
Chiquita	Ruby		Irwin.
Chloride Deposit	do		Do.
Carbonate King	Tin Cup		Tin Cup.
* Drew	do		Do.
* Defiance	Tomichi	Blossom, Wheeler & Co.	Tomichi.
* Domingo	Elk		Gothic.
Dodson Extension	Quartz Creek		Pitkin.
Denver and Ruby Silver Mining Company.	Ruby		Irwin.
Durango	do		Do.
* El Capitan	Tin Cup	James R. Mead	Tin Cup.
* Emma	do	T. J. McKenna	Do.
* Eureka	Elk	F. G. Gate.	Scofield.
* Evening Star	do		Gothic.
Eighty One	Quartz Creek		Pitkin.
* Elk Mountain Mining Company	Elk		Crested Buttes.
* Emma C	Quartz Creek	Geo. Wilson	Pitkin.
Ella	Ruby		Irwin.
Emma Burr	Tin Cup		Tin Cup.
Eagle Tunnel	Quartz Creek		Ohio City.
Eureka Gold and Silver Mining Company.	Tomichi	J. W. Jenkins	White Pine.
Eureka No. 2	Quartz Creek		Pitkin.
* Forest Queen	Ruby	R. W. Woodbury	Irwin.
* Fort Scott	Tomichi	W. W. Allis	Tomichi.
F. Z	Tin Cup	C. S. Nichols	Tin Cup.

List of mines in Colorado—Continued.

GUNNISON COUNTY—Continued.

Name of mine.	District.	Owners or managers.	Post-office address.
Fairview	Quartz Creek	A. E. Moore	Pitkin.
Fortune's Favorite	do		Do.
* Gold Cup	Tin Cup	—— Young	Tin Cup.
* Great West	Elk	Geo. E. Shaw	Gothic.
* Great Western Mining Company	do		Do.
* Gold Monument	Quartz Creek	J. G. A. Simpson & Co.	Pitkin.
* Gypsey	Tomichi		Tomichi.
* Grand Republic	Rock Creek		Crystal City.
* Gold Dust	Tin Cup	Downing Bros	Tin Cup.
Gray Beard	Quartz Creek		Pitkin.
Gussy Rodgers	do		Do.
Golden Gate	do		Do.
Gold Leaf	do		Do.
Governor St. John	do	Fellows & Kite	Do.
Gold Hill	do		Do.
Gaslight	do		Do.
Golden Curry	do	John Curry	Do.
Green Mountain Mining Company	do	A. E. Moore	Do.
Gunnison County Mining Company	Tomichi		Tomichi.
Galena Gulch Mining and Smelting Company.	do		White Pine.
Galena	do		Do.
Gothic	Elk Mountain	McNeil & Ross	Scofield.
Great Eastern	Ruby	E. M. De La Vergur.	Irwin.
Governor	Quartz Creek	Wade & Davis	Pitkin.
*Hancock	Elk		Gothic.
*H. and B. No. 1	Tin Cup		Tin Cup.
*H. and B. No. 2	do		Do.
Hancock	do		Do.
Hidden Treasure	do		Do.
Hutchinson Gold and Silver Mining Company.	Tomichi		White Pine.
*Independence	Ruby		Irwin.
*Iron Bonnet	Tin Cup	A. C. Brownell	Tin Cup.
*Iron Duke	Elk	Thos. Wilson	Gothic.
*Islet	Quartz Creek		Pitkin.
*I. X. L	Tomichi	O. Kirsch & Co	Pine Creek.
Iron Cap	Quartz Creek		Pitkin.
*Jimmie Mack	Tin Cup	E. C. Stoddard	Tin Cup.
*Jenny Lind	Elk		Gothic.
*Jennie B. Lee	Tin Cup		Tin Cup.
*Jim Fisk	do		Do.
Jackson City	do		Do.
*Katy Quinn	Tomichi		Tomichi.
Kimberly	Quartz Creek		Pitkin.
*Little Chief	Ruby		Irwin.
*Lead Chief	do	—— Morrison	Do.
*Little Minnie	do		Do.
*Lewiston	Tomichi	S. G. Field	Tomichi.
*Luona Mining Company	Elk	C. H. Garstin	Gothic.
*Lucille	Quartz Creek	Haid, Ford & Co	Pitkin.
*Little Mattie	do		Do.
Last Chance	Tin Cup		Tin Cup.
Little Emma	do		Do.
Lloyd's Tunnel	Tomichi	Harry Lloyd	White Pine.
Little Winnie	do	A. H. Terrell	Tomichi.
Legal Tender	Quartz Creek		Pitkin.
Little Maud	Tomichi		White Pine.
*Mayflower	Tin Cup	E. J. Graves	Tin Cup.
*Masher	do	Helmer & Co	Do.
*Midnight	Quartz Creek	John A. Baker	Pitkin.
*Moonlight	do		Do.
*Mineral Point Mining Company	Rock Creek		Crystal City.
*Montgomery	Tomichi		Tomichi.
*Milwaukee	Sheep Mountain		Crystal City.
*Moonstone	Quartz Creek	Haid, Ford & Co	Pitkin.
*Maggie Mitchell	do	A. Wirrich	Do.
Mountain Boy	do		Do.
Mary Mahan	Tin Cup		Tin Cup.
Mammoth	Tomichi	A. M. Eastman	Tomichi.
Micawber	Ruby		Irwin.
Monte Christo	do		Do.
M. C. R. R	Tin Cup	John Sweeney	Tin Cup.
Minnie Hall	do	Spencer Eldridge	Do.
McPherson Gold and Silver Mining Company.	Tomichi		White Pine.
North Star	Ruby		Irwin.

List of mines in Colorado—Continued.

GUNNISON COUNTY—Continued.

Name of mine.	District.	Owners or managers.	Post-office address.
North Star	Tomichi		Tomichi.
Narragansett	Quartz Creek		Pitkin.
New York and Quartz Creek Mining Company.	....do		Do.
*Old Missouri	Rock Creek		Crystal City.
*Ontario	Quartz Creek		Ohio City.
*Ontario	Tin Cup		Tin Cup.
Old Abe	Quartz Creek		Pitkin.
Oil Exchange	....do		Do.
Old Mexico	Ruby	V. A. Wilder	Irwin.
Old Sheik	....do		Do.
Ohio Mining Company	Quartz Creek		Ohio City.
*Pet	Tomichi		Tomichi.
*Porcupine Group	Quartz Creek	C. S. Roe	Pitkin.
Porcupine	Tin Cup		Tin Cup.
Queen Josephine	....do		Do.
*Ruby Chief	Ruby	Howard F. Smith	Irwin.
*Ruby King	....do		Do.
*Ruby Silver Mining and Smelting Company.	Elk Mountain		Gothic.
*Ruby and Treasury Mountain Mining Company.	Slate River		Crested Buttes.
*Rio Grande	Tin Cup		Tin Cup.
Rose Bud	Quartz Creek		Pitkin.
Rothschild	Tin Cup	J. C. Colvin	Tin Cup.
Ruby King	Quartz Creek		Pitkin.
Red Jacket	....do		Do.
R. E. Lee	Tomichi		Tomichi.
Ruby Durango Mining Company	Ruby	V. A. Wilder	Irwin.
Roaring Niagara	Tin Cup	H. S. Ermau	Tin Cup.
*Silvernite Mining Company	Elk Mountain	C. W. Watson	Gothic.
*Silver Temple	....do		Do.
*Sultan	Quartz Creek		Pitkin.
*Sultana	....do		Do.
*Scofield Mining and Smelting Company.	Elk Mountain		Scofield.
*Silver Queen	....do	B. F. Field	Gothic.
*Silent Friend	North Quartz Creek.	A. J. Conway	Pitkin.
*Sunlight	Quartz Creek	Babbitt & Co	Do.
*Saint Elmo	Elk Mountain	Burchnell & Co	Gothic.
Stock Broker	Quartz Creek		Pitkin.
Sugar Bowl	...do		Do.
Snow Flake	...do		Do.
Senator	Tin Cup		Tin Cup.
Spotted Tail	....do		Do.
Second National	Quartz Creek	James Bcyee	Pitkin.
Silver Mountain Mining Company	Ruby	E. Copley	Irwin.
San Juan	Tomichi		Tomichi.
Standard Mining Company	Ruby		Irwin.
Sacramento	Quartz Creek		Pitkin.
Silver Jewel	... do	Cate Bros. & Co	Do.
*Tin Cup	Tin Cup	T. J. McKenna	Tin Cup.
*Tin Cup Placer	Tin Cup Gulch		Do.
*Twin Lakes	Tomichi	Fred Greinez	Tomichi.
*Toronto	Quartz Creek		Pitkin.
Terrible	Tin Cup Gulch	H. A. Bradford	Tin Cup.
Twilight	Quartz Creek	Vance & Co	Pitkin.
*Union Park Placer	Tin Cup		Tin Cup.
Union Park Gulch Group	Quartz Creek	R. W. Spensley	Pitkin.
Uncle Sam	Tomichi		Tomichi.
Uncle Rufus	Quartz Creek		Pitkin.
*Virginia Gold and Silver Mining Company.	Elk Mountain	Chas. O. Avery	Gothic.
*Volunteer	Quartz Creek	M. C. Hermer	Ohio City.
Venango	Ruby	E. Copley	Irwin.
*Wanderer's-last-chance	Tin Cup		Tin Cup.
*Williams	Quartz Creek	John Curry	Pitkin.
*Wolverine	Wolverine Basin		Crested Buttes.
*West Virginia Mineral Mining Company.	Elk Mountain	C. H Schew	Scofield.
Wolverine	Tin Cup	G. A. Jackson	Tin Cup.
Way-Up	Quartz Creek	A. Falco	Pitkin.
West Willow	Tin Cup		Tin Cup.
Wichita	Elk Mountain	J. W. Phillips	Scofield.
Wonderful	Quartz Creek		Pitkin.
Young American	Ruby		Irwin.

List of mines in Colorado—Continued.

HINSDALE COUNTY.

Name of mine.	District.	Owners or managers.	Post-office address.
American Eagle	Park	A. Bartels	Lake City.
Adelia	Galena	do	Do.
* Belle of the West	Lake	John N. Manghan	Do.
* Belle of the East	do		Do.
* Black Wonder Consolidated Mining Co.	Sherman	W. W. Storey	Sherman.
* Black Crook	Park	Lindsley & Wright	Lake City.
* Bonanza King	Sherman	Carroll & Zacharin	Do.
* Conkling	Galena		Capitol City.
* Cooper Hill Mining Company	do		Do.
* Chandler	Sherman	Carroll & Zacharin	Lake City.
City of Paris	Park	J. T. Downey	Do.
Consolidated Bull Dog	Sherman	Jones & De Graw	Sherman.
Craven	Lake	A. R. Thompson	Lake City.
Capitol City	Galena	Jos. Donnell	Capitol City.
* Dolly Varden Mining Company	Sherman		Lake City.
Delmonico	Lake	F. M. Mendenhall	Do.
Dolphin	Sherman	McDougal & Balch	Sherman.
Daisy	Galena	E. H. Biggers	Lake City.
* Eagle Bird	Sherman	Carroll & Zacharin	Do.
El Paso	Galena	W. C. Sewman	Do.
Eagle's Nest	Engineer Mountain	H. D. Adams	Do.
Enterprise	Sherman	Rogers Bros	Sherman.
* Frank Hough Group	Engineer Mountain	—— Blaisdell	Lake City.
* Four Forty	Park	John Bradshaw	Do.
* Golden Fleece	Lake	Samuel Wendell	Do.
Gunnison Silver Mining Company	Tellurium		Tellurium.
* Highland Mary	Lake	Peter Robertson	Lake City.
Hannibal	do	Carroll & Zacharin	Do.
Irish Queen	Park	J. F. Downey	Do.
Inez	do	John N. Manghan	Do.
Jumbo	Sherman	Carroll & Zacharin	Do.
Keystone	Lake	Henderson & Co	Do.
Linden Mountain Mining Company	do		Do.
Lotta	Galena		Do.
* Miner's Home	Burrows Park	Broughton & Co	Burrows Park.
* Nora No. 2	Galena	Pine & Davey	Lake City.
* Mountain Secret	do		Do.
* Mayflower	Lake	J. B. Crydre & Co	Do.
* Moro	Galena	Search & Haley	Do.
* Morning Star	Lake	Wm. J. Brewster	Do.
Monster	Galena	W. P. Harbottee	Do.
Monticello	Park	Broughton & Co	Burrows Park.
Mountain View	Sherman	C. H. Bent	Sherman.
Mountain Chief	Lake	John Deeble	Lake City.
* Nerado	Sherman	Carroll & Zacharin	Do.
Neoga	Lake	T. S. Kirker	Do.
Nellie M	do	T. M. Mendenhall	Do.
Nellie S	Park	Wager & Co.	Do.
* Ocean Wave	Lake	E. D. Bouton	Do.
Occidental	Sherman	Carroll & Zacharin	Do.
* Plutarch	Lake	Riley, Moore & Co	Do.
* Palmetto Mining Company	Galena	J. H. Smith	Do.
* Polar Star	Engineer Mountain	H. Wood	Do.
* Polar Queen	do		Do.
Peoria Belle	Sherman	D. W. Pollock	Sherman.
Park	Park	Lindsley & Wright	Lake City.
Pass	Galena	P. E. Lewiston & Co.	Do.
Red Robin	Park	John Bradshaw	Do.
Red Cloud	Lake	B. W. Felder	Do.
* Saint Paul Silver Mining Company	Galena		Do.
* Saint Paul Sulphuret Consolidated Mining Company.	Lake	E. D. Bonton	Do.
* Saint Louis	Galena	Simmons & Bro	Do.
* Sheep Mountain Consolidated Mining Company.	do		Do.
Sherman Mining and Milling Company	Sherman	C. W. Cory	Sherman.
Silver Chord Mining Company	Galena		Capitol City.
Seven Thirty	Lake	Gideon Sutton	Lake City.
Sunshine	Sherman		Sherman.
Snowslide	do	Barber & Funk	Do.
Silver Monarch	Lake	Strawsburg & Cooper.	Lake City.
* Ute-Ule Mining Company	Galena	R. Crooke	Do.
* World's Wonder	Sherman	H. McIlvain	Sherman.
Western Spirit	Park	Wager & Co	Lake City.
Wisconsin and San Juan Mining Comp'y.	Lake	Hill Whitmore	Do.
* Yellow Jacket	Galena	John N. Manghan	Do.
Yellow Medicine	do	Mahon and Storm	Do.

List of mines in Colorado—Continued.

LAKE COUNTY.

Name of mine.	District.	Owners or managers.	Post-office address.
* Amie Consolidated Mining Company	Fryer Hill	T. F. Van Wagenen	Leadville.
* Argentine Mining Company		Frank Fohr	Do.
* Argent Mining Company	Yankee Hill	Henry Thompson	Do.
* Adelaide Mining Company	Adelaide Park		Do.
* American Mining and Smelting Company.	Little Ellen Hill	T. H. Ketcham	Do.
* Arctic	Adelaide Park	H. M. Teller	Do.
* A. Y	California Gulch	Samuel Harsh	Do.
* Ætna Mining Company	Carbonate Hill	J. R. Loker	Do.
* Antioch	Caliph Gulch	Webster, Miller & Co.	Do.
Alleghany Consolidated Mining Company.	Yankee Hill	John Marshall	Do.
* Big Pittsburgh Consolidated Mining Company.	....do	J. N. Vimont	Do.
* Breece Mining Company		M. H. Slater	Do.
* Brookland Mining Company	Carbonate Hill	S. Adams	Do.
* Big Chief	....do	Neils Larson	Do.
* Brian Born	Printer Boy Hill	J. W. Wallace	Do.
* Belgian	Iron Hill		Do.
Black Prince		J. T. Briggs	Do.
Black Tail	Printer Boy Hill		Do.
Boulder	Quartz Hill		Do.
Big Half Moon Mining Company	Twin Lakes	T. S. Wood	Do.
* Chrysolite Silver Mining Company	Fryer Hill	R. Nelson Clark	Do.
* Carbonate Mining Company			Do.
* Carbonate Hill Mining Company	Carbonate Hill	Geo. Summers	Do.
* Catalpa	....do	W. H. Gardiner	Do.
* Climax	Fryer Hill	T. F. Van Wagenen	Do.
* Colorado Prince		Alex. Bryden	Do.
* Crescent	Carbonate Hill	W. H. Gardiner	Do.
* Columbia Consolidated Mining Company.		C. C. Howell	Do.
* Compromise Mining Company	Yankee Hill		Do.
* Caddigan	Carbonate Hill	O. H. Harker	Do.
* Collateral	Caliph Gulch		Do.
* Clontarf	Carbonate Hill		Do.
Cliosophis	Printer Boy Hill	Leo Peterson	Do.
Colorado Gold Mining Company			Malta.
Comstock	Printer Boy Hill		Leadville.
Continental	....do		Do.
Champion	Twin Lakes	John F. Leland	Everett.
* Dunkin	Fryer Hill	Herbert Ford	Leadville.
* Dyer	Dyer Mountain	A. B. Capron	Do.
* Denver City Mining Company	Fryer Hill	Robert Bunson	Do.
* Dolphin Mining Company	....do	Herbert Ford	Do.
* Dillon Mining Company			Do.
* Dinero	Sugar Loaf Gulch	J. C. Langhorne	Do.
Defiance	Little Frying Pan Gulch.		Do.
Extenuate Gold and Silver Mining Company.	Twin Lakes		Twin Lakes.
* Evening Star Mining Company	Carbonate Hill	W. S. Ward	Leadville.
* Enterprise Mining Company	East Fryer Hill	George Steele	Do.
* First National		W. H. Gardner	Do.
* Forfeit	Iron Hill		Do.
Fryer Hill Mining Company			Do.
* Glass-Pendery		J. W. Wallace	Do.
* Green Mountain Mining Company	Caliph Gulch		Do.
* Grand View	Little Ellen Hill	—— Weil	Do.
* Gilt Edge	Caliph Gulch		Do.
* Gordon	Twin Lakes	Sharp & Kimball	Twin Lakes.
G. M. Favorite	Printer Boy Hill		Leadville.
* Henrietta Mining Company	Carbonate Hill	O. H. Harker	Do.
* Hibernia Mining Company	....do	L. C. Leonard	Do.
* Highland Chief Mining Company		G. B. Grant	Do.
* Hawkeye	Yankee Hill		Do.
Houston	Iowa Gulch		Do.
Hawkins Consolidated Mining Company			Do.
Highland Mary Mining Company			Do.
* Iron Silver Mining Company	California Gulch	W. Ahrens	Do.
* Iron			Do.
* Ines	Iron Hill		Do.
* Iowa Gulch Mining Company	Yankee Hill	N. H. Cone	Do.
* Iron Duke	Half Moon Gulch	O. H. Harker & Co	Do.
Jay Bird	Oro	J. J. Crooke & Co	Do.
Kent Mining Company			Do.
Kentucky Mining Company			Do.

List of mines in Colorado—Continued.

LAKE COUNTY—Continued.

Name of mine.	District.	Owners or managers.	Post-office address.
Knox County Mining Company			Leadville.
*Leadville Consolidated Mining Company	Carbonate Hill	O. H. Harker	Do.
*Long and Derry Mining Company	Long and Derry Hill	Long Bros. & Derry	Do.
*Little Pittsburgh Mining Company	Fryer Hill	E. C. Gilman	Do.
*Little Chief Mining Company	do	S. F. Pierson	Do.
*Little Ella			Do.
*Little Silver	Yankee Hill	—— Kearney	Do.
*Little Missouri	Caliph Gulch		Do.
*Little Ellen	Little Ellen Hill		Do.
*La Plata Mining and Smelting Company		M. E. Smith	Do.
*Lee Basin Mining Company	Yankee Hill	Robert Bunson	Do.
*Laplander	Lake Park		Do.
Lake Creek Gold and Silver Mining Company.		R. W. Mills	Everett.
Little Piney	Tennessee Pass	W. S. Duval	Malta.
Leadville and Gunnison Mining Company.	California Gulch	O. S. Crowthers	Leadville.
Little Johnnie	Breece Hill		Do.
*Matchless	Yankee Hill	L. C. Leonard	Do.
*Morning Star Mining Company	Carbonate Hill	W. S. Ward	Do.
*Miner Boy	Breece Hill	J. R. Brown	Do.
*Marion Mining Company	Stray Horse Gulch	P. J. Cunningham	Do.
*Montgomery	Caliph Gulch		Do.
*Maid of Erin	Carbonate Hill		Do.
*Mike and Starr	Iron Hill		Do.
Meyer Mining Company			Do.
*Nettie S	Printer Boy Hill	Leo Peterson	Do.
Nevada	South Evans Gulch.	August Rische	Do.
Nisi Prius	Iowa Gulch	Eddy & James	Do.
*Opulent	Little Ellen Hill	Lowrie & Co	Do.
*O'Donovan Rossa	Carbonate Hill	J. D. Morrisey	Do.
Ohio Boy	Taylor Hill	—— McLennan	Do.
*Park	Adelaide	J. B. Farwell	Do.
Pennsylvania	Taylor Hill	—— McLennan	Do.
Preston	Long and Derry Hill		Do.
Plattsburgh Junior		J. Greenlaw	Do.
Pilot	Printer Boy Hill	L. C. Leonard	Do.
Portland	Carbonate Hill	—— Carrera	Do.
*Robert E. Lee Mining Company	Yankee Hill	John D. Fleming	Do.
*Robert Emmet Consolidated Mining Company.	Caliph Gulch		Do.
*Rock and Dome	do	A. Ahrens	Do.
*Red Mountain Mining Company	Red Mountain		Twin Lakes.
*Ruby	Iron Hill		Leadville.
Reconstruction	Iowa Gulch	Judge Thatcher & Co.	Do.
Roseville Alta Consolidated Mining Company.	Canterbury Hill	N. N. Robertson	Do.
*Silver Cord	California Gulch	Tingley S. Wood	Do.
*Smuggler Consolidated Mining Company.	do	O. H. Harker	Do.
*Shields Mining and Milling Company	Little Frying Pan Gulch.	Fred. Buckley	Do.
*Sundown	do		Do.
*Saint Bernard Mining Company	Yankee Hill	John A. Sheridan	Do.
*Stonewall Jackson	Fryer Hill		Do.
*Sequin	Caliph Gulch	O. S. Crowthers	Do.
*Seneca	Stray Horse Gulch		Do.
*Small Hopes Consolidated Mining Company.	Yankee Hill	John T. Elkins	Do.
*Sunday	California Gulch	M. E. Smith	Do.
Squire	Rock and Dome Hill		Do.
South Side Mining Company	Lackawanna Gulch	John Flannery	Do.
*Tiger Consolidated Mining Company		Robert Bunson	Do.
*Terrible		W. S. Ward	Do.
*Tenderfoot	Little Ellen Hill		Do.
*Twin Lakes Gulch Placer Mining Company.	Twin Lakes		Twin Lakes.
Twin Lakes and Mount Elbert Mining and Milling Company.			Do.
T. L. Welch	Little Frying Pan Gulch.		Leadville.
Thespian	Carbonate Hill	G. A. Jenks	Do.
Trans-Atlantic	Fryer Hill	A. P. Curry & Co.	Do.
Tip Top	Twin Lakes	T. F. Van Wagenen	Do.
*Union Emma Mining Company			Do.
*United States Gold and Silver Mining Company.	Little Ellen Hill		Do.

List of mines in Colorado—Continued.

LAKE COUNTY—Continued.

Name of mine.	District.	Owners or managers.	Post-office address.
Uncle Sam	Quartz Hill		Leadville.
Ulster	Adelaide Park		Do.
*Virginius	Little Ellen Hill	J. W. Warren	Do.
*Vining			Do.
*Vanderbilt	Stray Horse Gulch		Do.
Victor Mining Company		J. J. McGowen	Do.
Venture	Little Frying Pan Gulch.		Do.
*Vining and Forfeit	California Gulch	J. L. Loomis	Do.
*Wolf Tone and Agassiz Consolidated Mining Company.	Carbonate Hill	Herbert A. Ford	Do.
William Wallace	....do		Do.
Western Union Mining Company			Do.
Whale Group		J. W. Jacque	Do.
Wolcot Mining Company		—— Dickey	Do.
Wilson	Printer Boy Hill		Do.

LA PLATA COUNTY.

Name of mine.	District.	Owners or managers.	Post-office address.
Bonanza Tunnel	Needle Mountain		Durango.
*Century	Bear Creek	J. P. Wallace	Do.
*Comstock	La Plata	Root & Ten Eyck	Parrott City.
*Iridos	Junction Creek	C. M. Reynolds	Durango.
Kennebec Mining Company	....do		Animas City.
*Mineral Wonder	....do	J. F. Bond	Durango.
Parrott City Gold Mining Company	La Plata	A. R. Lewis	Parrott City.
*Ruby King	Junction Creek	Chas. Hilliker	Durango.
*Snow Storm Mining and Milling Company.	La Plata	J. E. Downey	Do.
*Tippecanoe	Junction Creek	S. W. Pingrey	Do.
*Truckee	Needle Mountain	W. N. Dawson	Do.
*Wilber	....do	Bowman Bros	Do.
Webb, Anderson & Whiton Mining Company.	....do	Webb, Anderson & Whiton.	Do.

OURAY COUNTY.

Name of mine.	District.	Owners or managers.	Post-office address.
*Alta	Iron Springs	C. P. Sawyer	Ophir.
*Allied Mines	Uncompahgre	Wm. Weston	Ouray.
*Ausburg	San Miguel		San Miguel.
*Argentine No. 1	....do		Do.
*Argentine No. 2	....do		Do.
*Ajax	....do	J. R. Grant	Do.
Abbott	Uncompahgre		Ouray.
Atlas Mining Company	Iron Springs		Ophir.
*Brooklyn and San Miguel Mining Company.	San Miguel	Geo. S. Andrews	San Miguel.
*Boomerang	....do		Do.
*Bessie Bascom Mining Company	Sneffles	Jed. H. Bascom	Mt. Sneffles.
*Belle of Ouray	Bear Creek	F. F. Chisolm	Ouray.
*Bismuth	Sneffles		Mt. Sneffles.
*Butler	Iron Springs	H. W. Butler	Ophir.
*Big San Juan and New York Mining Company.	....do	L. G. Laureau	Do.
Bondholder Mining Company	Uncompahgre	Abram Cutler	Ouray.
*Cimarron	....do	Carpenter & Ohlwiler.	Do.
*Caroline Mining Company	....do		Do.
*Caribou	Iron Springs	Mark Folsom	Ophir.
*Circassian	Sneffles	A. W. Richardson	Mt. Sneffles.
*Calliope	Uncompahgre		Ouray.
*Cumberland	Sneffles		Mt. Sneffles.
*Crystal	....do	Wm. Weston	Do.
*Cottonwood Placer	Lower San Miguel		Lower San Miguel.
*Crown Point	Iron Springs		Ophir.
*Crystal	Uncompahgre		Ouray.
Crown Gem group	....do		Do.
Columbia	....do		Do.
Carpenter and Ohlwiler Mining Company	....do	J. W. Carpenter	Do.
Craven Jewel	Iron Springs		Ophir.
Crusader	Uncompahgre		Ouray.
*Dexter Mining Company	....do		Do.

List of mines in Colorado—Continued.

OURAY COUNTY—Continued.

Name of mine.	District.	Owners or managers.	Post-office address.
*Dolobran Mining Company	Marshall Basin	Thos. Tharless	San Miguel.
*El Dorado	Sneffles	Wm. Shultz	Mt. Sneffles.
*Elizabeth	Uncompahgre		Ouray.
Evans Mining Company	do	Mark Folsom	Ames.
Emma Mount Mining Company	do	Dan'l Geiger	Ouray.
Ethan Allen	Sneffles		Mt. Sneffles.
*Flagstaff	do	Nelson Peterson	Do.
*Finance	Uncompahgre		Ouray.
Fortune	San Miguel		San Miguel.
*Gold Ring	North Turkey Creek Basin.	Warren & Brown	Do.
*Governor	Old Stony Mount		Mt. Sneffles
*Garibaldi	Lake Fork	Cambour & Eder	Ouray.
*Garfield Mining Company	Uncompahgre	H. Peyton	Do.
*Grand View	do	Jas. Law	Do.
*Guston	do	D. C. Hartwell	Do.
*Germania Mining and Smelting Company.	do		Do.
Gold Run Placer	do		Pandora.
Greenback	Silver Mountain	W. A. Koneman	Ophir.
*Highland Lassie	Sneffles	A. W. Richardson	Mt. Sneffles.
*Humboldt	Uncompahgre	F. C. Meyer	Ouray.
*Highland Chief	Sneffles	A. W. Richardson	Mt. Sneffles.
*Hidden Treasure	do	Wm. Weston	Do.
Hancock	do	H. W. Reed	Do.
Hebron Mining Company	Uncompahgre		Ouray.
Hoodlum Tunnel Company	do		Pandora.
*Iron Clad	do		Ouray.
Illinois	do		Do.
*Keystone Hydraulic Mining Company	San Miguel		San Miguel.
*Keokuk Hydraulic Placer Mining Company.	do		Placerville.
Kentucky Giant	Uncompahgre		Ouray.
*Lincoln Boy	do		Do.
*Lewis	San Miguel		San Miguel.
*Lookout	Iron Springs	Geo. Crawford	Ophir.
Littly Mary	San Miguel		San Miguel.
*Mendota	Uncompahgre	Donnellon & Everett.	Ouray.
*Monongahela	do		Do.
*Mineral Farm	do	Edwin Steever	Do.
*Manhâttan and San Juan Mining Company.	do		Do.
*Mount Sneffles Milling and Reduction Company.	Sneffles	A. W. Richardson	Mt. Sneffles.
*Marshall Basin Mining Company	Uncompahgre		Telluride.
*Mother Cline	do	F. W. Pitkin	Ouray.
*Minnie Myrtle	San Miguel	Warren & Brown	San Miguel.
Merrimac	do		Do.
Monitor	do		Do.
Monitor	Uncompahgre		Ouray.
Mayflower	do		Do.
Magnolia	Iron Springs	Sears & Clark	Ophir.
Mountain Queen	do	W. A. Kourman	Do.
*Nevada	do	Mark Folsom	Do.
*Nettie	do		Do.
*N. W. H., jr	San Miguel		San Miguel.
New York and Ouray Mining Company	Uncompahgre		Ouray.
Oriental	San Miguel		San Miguel.
*Parsons	Iron Springs	Orrin Persons	Ophir.
*Pandora	North Turkey Creek Basin.		San Miguel.
*Plutus	Uncompahgre	Buckley & Munn	Ouray.
*Palmyra	San Miguel	Wattan & Dowd	San Miguel.
Portland Group	Uncompahgre		Ouray.
Pulaski	San Miguel		San Miguel.
Pony	Uncompahgre		Ouray.
*Queen of Ouray	do	Wm. Story	Do.
*Ruby Trust	Sneffles	A. G. Siddons	Mt. Sneffles.
*Revenue Group	do	Wright & Cooper	Do.
*Royal Consort	Uncompahgre	F. W. Pitkin	Ouray.
*R. E. Lee	Marshall Basin		San Miguel.
Red Cross Placer	San Miguel		Do.
Rose Group	Uncompahgre		Ouray.
*Smuggler	do		Do.
*Silver Link Mining Company	do	—— Worthington	Do.
*Silver Point	do		Do.

List of mines in Colorado—Continued.

OURAY COUNTY—Continued.

Name of mine.	District.	Owners or managers.	Post-office address.
*Smuggler	North Turkey Creek Basin.		San Miguel.
*Sheridan	San Miguel	D. C. Hartwell	Do.
*Snow Drift	Sneffles	Haynes & Adams	Mt. Sneffles.
*Sailor's Fortune	...do		Do.
*Silver Belle	Iron Springs	Frank Mogensen	Ophir.
*Summit Mining Company	...do	O. P. Posey	Do.
*Silver Flake	Uncompahgre	Chris. Cogan	Ouray.
Silver Star	...do	Costigan & Story	Do.
*Sivyer	...do		Do.
*Snow Bird	Sneffles		Mt. Sneffles.
*Sneffles	San Miguel		San Miguel.
*Shamrock	...do		Do.
*Saint Louis and Lower San Miguel Placer Mining Company.	...do		Placerville.
Spar	Iron Springs		Ophir.
Silver Queen	...do	Silsby, Bates & Co	Do.
Silver Mountain Mining Company	...do		Do.
Silver King	Uncompahgre		Ouray.
San Juan and New Jersey Mining Company.	...do		Do.
Sidney	Sneffles	Dan'l Geiger	Mt. Sneffles.
San Miguel Gold and Silver Mining Company.	San Miguel	Amos Lane	San Miguel.
Savage	Uncompahgre	J. C. W. Pendleton	Ouray.
Silver Mountain Tunnel Company	Iron Springs		Ophir.
*Trout and Fisherman			Ouray.
*Terrible		H. W. Reed	Mt. Sneffles.
*Turkey Creek Placer	Turkey Creek	F. R. Hamilton & Co.	San Miguel.
*Tip Top	Iron Springs	Geo. Crawford	Ophir.
*Union Combination Mines	Bear Creek		Ouray.
*Union	Uncompahgre		Do.
Upper San Miguel Mining and Milling Company.	...do	A. T. Nichols	Telluride.
*Valley View	...do		Ophir.
*Windham Mining and Smelting Company	...do		Windham.
*Wheel of Fortune Consolidated Mining Company.	Sneffles	A. W. Richardson	Mount Sneffles.
*Willow Creek Placer	San Miguel	A. C. Boyle	San Miguel.
Wild Yankee Group	...do		Do.
Woodburn	...do	Brown & Warner	Do.
*Young America	Uncompahgre		Ouray.
*Yankee Boy Group	Sneffles		Mount Sniffles.
*Yellow Rose	...do	Wm. Weston	Do.

PARK COUNTY.

Name of mine.	District.	Owners or managers.	Post-office address.
*Alma Placer Mining Company	Buckskin	Head & Co	Alma.
*Abbington Mining Company	...do	J. B. Schwartz	Do.
Atlantic	North Star Mountain	Wm. Bemrose	Montgomery.
Avalanche	Montgomery		Do.
*Boaz Mining Company	Loveland Mountain		Alma.
*Belle Isle	Buckskin	J. C. Powers & Co	Do.
*Bullion	Mount Lincoln	New Haven Mining Company.	Do.
*Badger Boy	Horseshoe	McFerren, Riley & Co.	Horseshoe.
*Bonanza King	Mosquito	M. A. Lawrence	Alma.
*Blaine	Mount Bloss	M. McDonald	Do.
*Black Barnet Consolidated Mining Company.	Buckskin		Do.
*Beaver Creek Placer	Beaver Creek	S. H. Pease	Fairplay.
Boulder	Mosquito	J. G. Brooks	Alma.
Black Hawk	Pennsylvania Gulch	Chas. Shields	Do.
Bullion Mountain Mining and Smelting Company.	Hall's Gulch	Chase & Allen	Do.
Boone	Mount Bross	Fuller, Butler & Co.	Do.
*Criterion	Pennsylvania	W. H. Kingsbury	Do.
*Cashier	Hall's Valley		Hall's Valley.
*Colorado Springs	Mount Bross	Peter Becker & Co	Alma.
*Centennial	Montgomery	S. H. Standart	Do.
*Consolidated Danville Mining Company	Mount Lincoln		Do.
*Crystal Lake Mining Company	...do		Do.
*Crusader Group	Horseshoe	Geo. F. Batchelder	Horseshoe.

List of mines in Colorado—Continued.

PARK COUNTY—Continued.

Name of mine.	District.	Owners or managers.	Post-office address.
*Connoran	Buckskin	E. Connoran	Alma.
*Crapo	Sacramento Gulch		Do.
*Cliff	do		Do.
*Cornucopia	Mosquito	M. A. Lawrence	Do.
*Congress	do		Do.
Commercial	Buckskin	Jenkins & Comingo	Do.
Crescent	Hall's Gulch		Hall's Valley.
Champaign	Mosquito	W. F. Redman	Alma.
Chicago Group	Hall's Gulch		Hall's Valley.
*D. H. Hill Group	Mount Lincoln	Pembroke Mining Company.	Alma.
Dodge City Mining Company	Montgomery	J. W. Straughn	Do.
Digger No. 1	Silverheels Mountain	J. C. Phillips & Co.	Do.
Des Moines Smelting and Mining Company.	Montgomery	F. D. Jewett	Do.
Dauntless	Horseshoe		Horseshoe.
*Excelsior	Mount Bross	Pennslyvania Consolidated Mining Company.	Alma.
*Earnest	Buckskin	B. F. Joslin & Co.	Do.
*Easton and Pennsylvania Consolidated Mining and Milling Company.	Pennsylvania		Do.
*Emma	Sacramento Gulch	Remlin, Miller & Co.	Do.
*Eastern Silver Mining Company	Buckskin		Do.
East Leadville Mining and Smelting Company.	Mosquito		Park City.
Eldorado	do	M. A. Lawrence	Alma.
*Fairplay Gulch Placer	Fairplay	C. H. Smith	Fairplay.
*Forest Queen	Mosquito	Walker & Kirker	Alma.
*Fanny Barrett Mining Company	do	A. H. Clements	Do.
Fairsourgh	Mount Lincoln	T. W. Duffy & Co.	Do.
Ford Consolidated Mining Company	Mount Bross		Do.
Florence Group	Pennslyvania Gulch	Williams & Morgan	Do.
Fannie Morris	Mosquito	M. A. Lawrence	Do.
*Gertrude	Head of Platte		Do.
*Grand View	Mosquito		Fairplay.
*Great West Mining Company	Mount Bross	C. W. Kellogg	Alma.
*Geneva Consolidated Mining and Smelting Company.	Como		Grant.
*Glasgow Silver Mining Company	Buckskin	W. J. Mullen	Alma.
*Gold Star	Montgomery	W. E. Travers & Co.	Montgomery.
Galveston	Mount Bross	Thos. Duffy	Alma.
Grand View	Horseshoe	Paggett, Henderson & Co.	Do.
Granite Silver Mining Company	Bullion Mountain	T. C. Johns	Do.
Great Eastern Group	Hall's Valley	John Fleming & Co.	Hall's Valley.
Grace	Mosquito		Alma.
*Hock Hocking	Pennsylvania Gulch	H. D. Howe	Do.
*Hall and Brunk Silver Mining Company	Mount Bross	John T. Brownlow	Do.
*Hall's Valley Mining and Smelting Company.	Hall's Gulch	I. G. Sharp	Hall's Valley.
*Hall's Gulch Consolidated Mining and Tunnel Company.	do	C. W. Dake	Do.
*Hancock	Mosquito	M. A. Lawrence	Alma.
*Hall, Bartlett, and Rische Placer	Montgomery		Do.
*Hope	Head of Platte	A. G. & A. L. Shidler	Montgomery.
*Hoyle	Montgomery	A. H. Estes	Alma.
Hunkidori	Mount Bross	Geo. W. Snell & Co.	Do.
Horseshoe and Sheep Mountain Mining Company.	Horseshoe		Horseshoe.
Iron Duke	do	John Sullivan	Park City.
Imperial Mining Company	Mosquito	W. F. Kendric	Alma.
Iowa Gold and Silver Mining Company	do	W. S. Shoemaker	Do.
Independent	Hall's Gulch		Hall's Valley.
Inter Ocean Mining Company	do		Do.
*J. G. Blaine	Buckskin	Finley Anderson	Alma.
*Jacob Wonder	Mosquito		Do.
*Kelsey	Montgomery	A. H. Estes & Co.	Montgomery.
*Kansas Consolidated Mining Company	Mosquito		Fairplay.
*Kansas City	Buckskin	Geo. A. Allison	Do.
*Kansas Mining Company	Montgomery	J. W. Whitlatch	Montgomery.
*K. P	Loveland		Alma.
*London Consolidated Mining Company	Mosquito	J. F. Herrick	Do.
*Lincoln	Mount Lincoln		Do.
*Lelon Peabody Placer Mining Company	Como	Lelon Peabody	Como.
*Little Corinne	Mosquito	J. H. Bartlett	Alma.
*Lone Star Consolidated Mining Company	do	Wm. E. Johnson	Do.
*Little Ross	Mount Bross	H. J. Stevens	Do.

List of mines in Colorado—Continued.

PARK COUNTY—Continued.

Name of mine.	District.	Owners or managers.	Post-office address.
*Little Esther	Mount Bross	A. Weiner	Alma.
*Lizzie	Montgomery	W. E. Travers & Co.	Do.
Little Annie Consolidated Mining Company.	Buckskin	H. H. Richardson	Park City.
Lady Helen Silver Mining Company	Buckskin	A. G. Anderson	Alma.
Little Earnest	do	J. C. Joslin	Do.
Lower Belt Mining Company	do	H. H. Richardson	Do.
Lucky Queen	do	H. J. Bagley	Do.
Last Chance	Horseshoe	Graham, McMillan & Co.	Do.
*Moose	Mosquito	John M. Fritz	Do.
*Missouri	Hall's Gulch	Hart & Yont	Hall's Valley.
*Mudsill Group	PennsylvaniaGulch.	A. S. McLean	Horseshoe.
*Morning Star	Buckskin		Alma.
*Mosquito Range and Buckeye Silver Mining Company.	Mosquito		Do.
Mountain King	Montgomery		Montgomery.
Minerva	Horseshoe	T. T. Willey	Alma.
Moynahan Mining Company	Mosquito	Jas. Moynahan	Do.
Monte Christo Mining Company	do		Do.
Montgomery	Montgomery		Montgomery.
Millionaire Mining Company	Hall's Gulch		Hall's Valley.
*McMartin Placer	Montgomery		Montgomery.
*New York Mining Company	Mosquito	Patrick Sullivan	Park City.
*New Haven Mining Company	Mount Lincoln		Alma.
Nestor Mining Company	Mosquito		Do.
Northern Light	Buckskin	Abram Bergh	Do.
*Old Orphan Boy	do	C. H. Smith	Park City.
*Occidental	Mount Lincoln	J. W. Hoppy	Alma.
*Ontario	Mount Bross	Willard, Howe & Co.	Do.
Omaha Boy	Sacramento Gulch	Lacey, Foster & Co.	Do.
Orion	Mount Lincoln	McDonald & Schwartz.	Do.
Oneida Chief	do	J. G. Brooks	Do.
*Ollie	Mosquito	M. A. Lawrence	Do.
*Prosperity	Mount Bross	Jos. Summers	Do.
*Pennsylvania Consolidated Mining and Milling Company.	do	B. C. Hoag	Do.
Present Help	do		Do.
Park County Mining Company	Pennsylvania Gulch	Chas. O. Sheilds	Do.
Park Pool Mining Company			Fairplay.
Phillips			Alma.
Pine Tree Gold and Silver Mining Company.	Montgomery	M. A. Lawrence	Montgomery.
Parnell Mining Company	Mosquito	Geo. Sinnott	Alma.
Phœnix Consolidated Mining Company	Montgomery	F. D. Howe	Montgomery.
*Pioneer Mining Company	Buckskin	G. W. Brunk	Alma.
Quincy Mining Company	Platte	Edward Curran	Platte Station.
Queen of the Lakes Mining Company	Buckskin		Alma.
*Russia	Mount Lincoln	Russia Mining Company.	Do.
*Rob Roy	Montgomery	W. E. Travers & Co.	Montgomery.
Ready Pay	Hall's Gulch		Hall's Valley.
*Silver Gem Mining Company	do	T. C. Johns	Do.
*Sacramento	Sacramento Gulch	C. W. Dwelle & Co.	Alma.
*Silver Wave	Mount Bross	Wood, Adrian & Snell.	Do.
*Silver Gem No. 1	Pennsylvania Gulch	James Moynahan	Do.
*Silver Gem No. 2	do	do	Do.
*Sovereign Gold Mining Company	Montgomery		Do.
*Sunny South Mining Company	Mosquito	Minihan & Regan	Do.
Silver Issue	Montgomery		Do.
Smuggler	do	F. F. Mullen	Do.
Sherwood	Little Sacramento Gulch.	H. J. Stan	Do.
Sweet Home	Buckskin	Finley Anderson	Do.
Silent Friend Mining Company	Platte	N. A. Rice	Platte Station.
Saint Louis	Hall's Gulch		Hall's Valley.
Shark	do		Do.
Sacramento and Mosquito Gold and Silver Mining Company.	Mosquito		Alma.
*Ten Forty	Buckskin	Elbert Evans & Co	Do.
*Tarwall Placer	Georgia	Geo. Peabody	Do.
Three Brothers	Montgomery	Patrick Sullivan	Park City.
Treasure Vault Mining Company	Como	J. B. Cleveland	Grant.
Tennessee Group	Buckskin	Williams & Morgan.	Alma.
Taylor Group	Montgomery	E. D. Taylor	Montgomery.
Tippecanoe	do	do	Do.

List of mines in Colorado—Continued.

PARK COUNTY—Continued.

Name of mine.	District.	Owners or managers.	Post-office address.
*U. P	Loveland	Leavick & Walsh	Alma.
*Upper Platte Mining Company	Hall's Gulch		Hall's Valley.
*Wilson and Lime	Mount Lincoln	Mount Lincoln Gold and Silver Mining Company.	Alma.
*Weston	Pennsylvania Gulch	Darnell & Co	Do.
*Western	do	H. D. Howe	Do.
*Whale	Hall's Gulch	H. C. Frost	Hall's Valley.
*Wyandotte Group	Buckskin	G. W. McNasser & Co.	Alma.
Wyoming	Mount Bross	McDonald & Kearns	Do.
Wheeler Mining Company	Buckskin		Do.
*Ypsilanti	Hall's Gulch	J. B. Stone	Hall's Valley.

PITKIN COUNTY.

Name of mine.	District.	Owners or managers.	Post-office address.
Alcyone	Pearl Mountain		Ashcroft.
*Buckhorn No. 2	Conundrum		Aspen.
*Black Bess	Elk		Ashcroft.
Boston	Conundrum Basin		Aspen.
Birthday Group	do		Do.
Brodine	Elk	Williams, Hopkins & Co.	Ashcroft.
Broadway	Conundrum		Aspen.
*Camp Bird	do	C. W. Durand	Do.
*Climax	do		Highland.
*Chloride	do		Aspen.
*Cummings	do		Do.
Copper King	Elk		Ashcroft.
Castle Peak	do		Do.
Castle Rock	do		Do.
Champion	Independence		Sparkill.
Cæsar	Conundrum		Aspen.
Colorado Central	do		Do.
Durant	do		Do.
Dixie	do		Do.
*Eva Belle	do		Do.
*Evening Star	do		Do.
Eureka	do		Do.
*Farwell Consolidated Mining Company.	Independence	Robt. Booraem	Independence.
*Fannie Vance	Mount Good Hope	L. C. Leonard & Co.	Ashcroft.
Grand Prize	Conundrum		Aspen.
Gertrude S	do	J. C. Eames	Do.
General Shields	do	M. C. Hayes	Do.
Great Western			Independence.
Gold Comet	Conundrum		Aspen.
Grand Union	do		Do.
Gray Carbonate	do		Do.
Handy Andy	do		Do.
Hard Cash	do	Church & Powers	Do.
Highland Chief	Elk		Ashcroft.
Hidden Treasure	do		Do.
Hattie B	do		Do.
Highland Tunnel	Conundrum		Aspen.
Iowa	do		Do.
Jennie Lind	do	D. R. C. Brown	Do.
*Kansas City	Brush Creek	Brashare & Frost	Ashcroft.
*Little Giant	Conundrum	Chas. R. Bell	Aspen.
*Little Rule	do		Do.
*Leona	Elk		Ashcroft.
Louisa	Conundrum		Aspen.
Late Acquisition	do		Do.
Lone Pine	do		Do.
Lincoln	do		Do.
Little Percy	do		Do.
*Mount Hope	Independence		Sparkill.
*Montezuma	Pearl Mountain		Ashcroft.
Mountain Ranger	Conundrum		Aspen.
Monarch	do		Do.
Minnie	Independence		Sparkill.
*New York	Conundrum	James Burns	Aspen.
*Oakland No. 1	do		Do.
*Oakland No. 2	do	Hersey & Herrick	Do.
Oneida	do		Do.
Osborn	do	— Riggin	Do.

List of mines in Colorado—Continued.

PITKIN COUNTY—Continued.

Name of mine.	District.	Owners or managers.	Post-office address.
*Paradox	Elk	Major Lonegan	Ashcroft.
*Pioneer	Conundrum		Aspen.
*Pearl Group	Pearl Mountain		Ashcroft.
Pauline	Elk		Do.
Philadelphia Mining Company	Pearl	S. Alsop	Do.
Pride of Aspen	Conundrum		Aspen.
Pitkin County Mining Company	do		Do.
Quaker City	Quaker Mountain		Do.
Reno	Conundrum		Do.
Rainstorm	Pearl Mountain	J. A. Kenney	Aspen.
*Spar	do	—— Thomas	Do.
*Smuggler	do		Do.
*Swedish Queen	do		Do.
Silver Chief	do		Do.
Saint Elmo	Elk		Ashcroft.
Snowstorm	do		Do.
Silver Star	Conundrum		Aspen.
Silver Bell Mining Company	do		Do.
Sinclair Tunnel	do		Do.
*Tam O'Shanter	Pearl Mountain	Eben. Smith	Ashcroft.
*Tourtellotte Group	Conundrum	Henry Tourtelotte.	Aspen.
*Tibbetts	Elk Mountain	J. A. Kinney	Ashcroft.
Titan	Conundrum		Aspen.
Trainer	do		Do.
*Unexpected	do	Geo. Thatcher	Do.
Winnie	do		Do.
Waterfall	Elk	David Scull, jr., & Co.	Ashcroft.
Wichita	do		Do.
Yellow Boy	do		Do.

RIO GRANDE COUNTY.

*Aztec Mining Company	Summit	H. Scheffer & Co.	Del Norte.
*Cornwall Mining Company	do		Cornwall.
*Gold Placer Mining Company	do		Summitville.
*Highland Mary Mining Company	do		Do.
*Little Annie	do	Moody & Archer	Cornwall.
*Missionary Milling and Mining Company.	do	B. Borroughs	Summitville.
*Summit Mining Company	do	R. F. Adams	Do.
*San Juan Consolidated Mining Company	do	Judge T. M. Bowen	Del Norte.

ROUTT COUNTY.

*Hahn's Peak Gold and Silver Mining Company.	Hahn's Peak	McIntosh & Cody	Hahn's Peak.
*Carruthers, Lynch and Hinman Mining Company.	do	Carruthers & Co	Do.

SAN JUAN COUNTY.

*Aspen	Los Animas	New York and San Juan Mining and Smelting Company.	Silverton.
Alaska	do		Do.
Animas Forks Mining Company	Poughkeepsie		Animas Forks.
Alleghany Silver Mining Company	do		Mineral Point.
*Belchor Mining Company	Animas	Fred E. Horton	Silverton.
*British Queen Mining Company	Lake Mountain	H. P. Lyon	Mineral Point.
Burns Gulch Mining Company	Eureka		Eureka.
Buffalo Mining Company	Poughkeepsie		Mineral Point.
Bullion	do		Animas Forks.
Blue Belle	Round Mountain	Reed & Collins	Silverton.
Big San Juan Mining and Milling Company.	Animas	L. G. Laneeair	Do.
Boston and San Juan Mining Company	do	C. H. Slocum	Do.
Beaton Mining Company	do		Howardsville.

List of mines in Colorado—Continued.

SAN JUAN COUNTY—Continued.

Name of mine.	District.	Owners or managers.	Post-office address.
Bill Young	Animas		Silverton.
Bill Young	Poughkeepsie	A. W. Burrows	Do.
Cuba	Eureka	T. B. Comstock	Eureka.
Chicago and Colorado Mining Company	Poughkeepsie		Animas Forks.
Chicago Enterprise Mining Company	do	J. R. Hunt	Do.
Congress	Animas	Bosie & Co	Silverton.
Columbia	do	Henry Pascoe	Do.
California	do		Do.
Cascade	do	J. Orr	Do.
Crystal	do	Reed & Collins	Do.
Cleveland Consolidated Mining Company	Sultan Mountain	T. C. Wilson	Do.
Crown Mountain Mining Company	Eureka		Eureka.
Columbus Mining Company	Poughkeepsie	O. Allison	Animas Forks.
*Eclipse Mining and Smelting Company	Hurricane Peak	—— Grant	Do.
Fort Wayne	Eureka		Eureka.
*Franklin	Silver Park		Animas Forks.
*Green Mountain Mining Company	Animas	Fred. E. Horton	Silverton.
*Green Mountain Mining Company	Cunningham Gulch.	G. H. Ingersoll	Do.
Gray Eagle	Animas	Silverton Gray Eagle Mining Company.	Do.
Graham Silver Mining Company	Poughkeepsie		Animas Forks.
Great Animas	do		Do.
Gorden	Eureka		Eureka.
Golden Fleece	Animas		Silverton.
*Highland Mary	do	D. W. Briger	Do.
*Hurricane Mountain Mining Company	Cement Gulch	H. B. Hoyt	Animas Forks.
I. X. L. Tunnel	Arasta Gulch		Silverton.
Indian Chief Mining and Milling Company	Poughkeepsie		Mineral Point.
Inter-Ocean Mining Company	do		Animas Forks.
*King Solomon	Animas	French Boys Silver Mining Company.	Silverton.
*Kalamazoo Bonanza Mining Company	Poughkeepsie Gulch		Animas Forks.
Kansas City and San Juan Mining Company.	Animas	A. L. Harris	Silverton.
Lula	Grouce Gulch	Nichols & Co	Do.
*McKennie	Niagara Gulch	T. B. Comstock	Eureka.
Maid of the Mist	Poughkeepsie	H. C. Olney	Mineral Point.
Midland Mining Company	Neigold	P. Niegold	Niegoldstown.
Mineral Mountain Mining Company	Poughkeepsie		Mineral Point.
Mastodon	do	A. A. Hard	Animas Forks.
Mineral Point Mining Company	do		Do.
Mineral King	Prospect Basin	Elmer King & Co	Gladstone.
Mellville Mining and Reduction Company	Animas		Silverton.
My Choice	do		Do.
Moline Silver Mining Company	Eureka		Eureka.
*New York and San Juan Mining Company.	Animas		Silverton.
Norma	Poughkeepsie		Do.
Oriental Mining Company	Arastra Gulch		Do.
Oberta	Uncompahgre	L. B. Kendell	Do.
*Pride of San Juan	Niagara Gulch	T. B. Comstock	Eureka.
*Polar Star	Poughkeepsie		Mineral Point.
*Peter's Placer	Eureka	C. F. Peters & Co	Eureka.
Pittsburgh Silver Mining Company	Poughkeepsie		Mineral Point.
Palmyra	do	S. W. Reymond	Do.
Pride of the West	do		Howardsville.
Pine Bluffs Mining Company	do		Animas Forks.
Poughkeepsie	Poughkeepsie Gulch	G. W. Howard & Co.	Do.
Potomac	Poughkeepsie		Silverton.
*Red Cloud Mining and Milling Company	do	R. Trezona	Mineral Point.
Round Mountain Queen	Proulder Gulch	Reed & Collins	Silverton.
Red Rodgers	Animas		Do.
*Scotia	Eureka	Reynolds & Co	Eureka.
*Sunnyside	do	Engleman & Co.	Do.
*Sultan Mining Company	Sultan Mountain	John F. Williams	Silverton.
*Silver Monarch	Poughkeepsie Gulch	Strasburg & Cooper.	Do.
*Salom	Poughkeepsie	Hodges & Co	Do.
*Silverton Mining Company	do	O. P. Posey	Do.
*Sultan Mountain Mining Company	Sultan Mountain	O. P. Posey	Do.
Silver Peak Mining and Smelting Company.	Poughkeepsie	W. McFarland	Animas Forks.
San Juan Central Mining Company	do		Do.
San Juan Mining and Smelting Bullion Company.	do		Do.
San Juan Gold and Silver Mining Company.	do		Do.
Solomon Silver Mining Company	Animas		Silverton.
Sedalia	Round Mountain	Ike Johnson	Do.

List of mines in Colorado—Continued.

SAN JUAN COUNTY—Continued.

Name of mine.	District.	Owners or managers.	Post-office address.
Sal Custer	Animas	E. T. Sweet	Silverton.
Silver Coin group	Poughkeepsie	Bowman & Co	Animas Forks.
*Tabor	Niagara Gulch	T. B. Comstock	Eureka.
Tom Moore	....do	R. S. Cross	Do.
U. S. Treasury	South Lookout Mountain.	E. W. Hodges	Silverton.
Whale	Round Mountain	O'Neil Bros	Do.
*Yankee Girl	Red Mountain	George Crawford	Animas Forks.
Zulu	Poughkeepsie		Silverton.

SAGUACHE COUNTY.

Name of mine.	District.	Owners or managers.	Post-office address.
*Albert	Enterprise Gulch	William Love	Bonanza.
*Arkansas	Kerber Creek	D. Howard	Exchequer.
*Antero	Squirrel Gulch	Mathyas & Co	Bonanza.
Anna	Kerber		Do.
Abe Lincoln	Spring Creek		Do.
*Bonanza	Kerber	O. W. Kelley & Co	Do.
*Belmont	Enterprise Gulch	L. O. Miller	Sedgwick.
*Boss Mammoth	Kerber Creek		Bonanza.
Belle of Colorado	....do		Do.
*Carrie Eugene	....do	C. E. Braining	Do.
*Columbia	Little Kerber	McIntire & Co	Do.
*Crœsus	Rawley Gulch	Kinney & Co	Do.
*Cornucopia	...do		Do.
*Canada	Copper Creek		Do.
*Deming	Kerber		Do.
Dakota Mining Company	Kerber Creek	W. R. Park	Sedgwick.
Detroit	Kerber	A. H. Gilldeman	Bonanza.
*Exchequer	Kerber Creek	Colonel Comstock	Do.
*Empress Josephine	Copper Creek		Do.
*Empire	Kerber Creek	Mineral Hill Mining Company.	Do.
Exchange	....do	—— Moffitt	Do.
*Four-per-cent	Round Mountain		Do.
Forest Queen	Kerber	P. R. Cuddigan	Do.
Flagstaff Mining Company	Flagstaff Mountain		Sedgwick.
Fairview	Kerber		Do.
Fountain	....do		Bonanza.
*Galveston Mining Company	Hayden		Oriental.
*Great Republican	Kerber		Bonanza.
Gold Bug	Enterprise Gulch		Sedgwick.
Garfield	Hayden	James T. Tipton	Creston.
*Hortense	Copper Creek	Carlson & Co	Bonanza.
*India	Stowe's Gulch	Captain Reed	Do.
*John A. Logan	....do	Captain Baker	Do.
*June	Kerber		Sedgwick.
Joe Bennett	....do		Bonanza.
*Keystone	Rawley Gulch	Rathoon & Co	Do.
*Kearsarge	Hamilton Gulch	Dan. Halley	Do.
*Little Jennie	....do	A. N. Butts & Co	Do.
*Little Elva	Bear Gulch	R. J. Nugent	Do.
*Lawrence	Rawley Gulch		Do.
*Last Resort	Ford Creek		Do.
Love Mining Company	Kerber		Do.
Little Albert	....do		Sedgwick.
*Michigan	Rawley Gulch	H. Sayer	Bonanza.
*Mineral Hill Mining Company	Kerber		Do.
*Mount Joy	Hamilton Gulch		Do.
*Minnie Lee	Copper Gulch	C. H. Newcombe	Do.
*Mountain Lion	Hayden		Crestone.
Monitor No. 4	Hamilton Gulch		Bonanza.
Monitor No. 2	... do		Do.
Maryanne	Sunbeam Mountain	John Hugo & Co	Crestone.
*North Andover	Hayden Pass		Do.
*North Crestone Mining and Milling Company	....do	Major Cooper	Do.
Nil Desperandum	Kerber Creek		Sedgwick.
*Orthole	Rawley Gulch		Bonanza.
Plattsburgh Mining Company	Hayden Pass		Oriental.
*Phantom	Ford Creek		Bonanza.
*Paris	Kerber		Do.
*Pacific	Rawley Gulch	Colonel Comstock	Do.
*Paragon	....do	H. Hanson	Do.
Payson Group	Hamilton Gulch	Johnson, Wright & Co.	Do.

List of mines in Colorado—Continued.

SAGUACHE COUNTY—Continued.

Name of mine.	District.	Owners or managers.	Post-office address.
*Quaker City	Hayden Pass		Oriental.
*Radcliff	Hamilton Gulch		Bonanza.
*Revenue	Kerber Creek	J. B. Monroe	Do.
*Rawley	Rawley Gulch	W. P. Linn	Do.
Robert E. Lee	Nil Desperandum		Do.
*Superior	Rawley Gulch	Colonel Comstock	Do.
*Susthesus	Squirrel Gulch		Do.
*Sharinet	Round Mountain		Do.
*Star	Rawley Gulch		Do.
Steuben	do		Do.
*Townsend	do		Do.
*United States	Stowe's Gulch	Captain Reed	Do.
*Whale	Rawley Gulch	Coombs & Co	Do.
*Wild Cat	Kerber Creek		Do.
Wisconsin	do		Do.
*Yankee Doodle	do		Do.

SUMMIT COUNTY.

Name of mine.	District.	Owners or managers.	Post-office address.
*American Mining and Smelting Company	Ten Mile		Ten Mile.
Anglo-American Mining Company	Eagle River	H. A. Plimpton	Red Cliff.
August Flower	Ten Mile		Ten Mile.
Addie	do	James P. Stewart	Do.
Atlantic	Snake River		Breckenridge.
*Blue River Mining Company	Blue River	R. A. Sanky	Do.
*Boston and Colorado Placer Mining Company	Nigger Hill		Do.
*Belle	Montezuma		Montezuma.
*Boston	do		Do.
*Belden	Eagle River	D. D. Belden	Red Cliff.
*Boston and Sheep Mountain Mining Company	Ten Mile	Thomas Gowenlock	Ten Mile.
*Blanch	Montezuma		Montezuma.
*Berlin Placer	Nigger Hill	John Boylan	Breckenridge.
*Black Iron	Bell's Camp	Judge D. D. Belden	Red Cliff.
*Brooks Snider	Nigger Hill	T. W. Brooks	Breckenridge.
Badger	Ten Mile	D. N. McDonald	Kokomo.
Bledsoe	do		Do.
Bell	Peru		Breckenridge.
Bonanza	Mineral Hill		Do.
Breckenridge Mining Company	do		Do.
Black Bess	Ten Mile		Kokomo.
Black Dragon	do		Do.
Bufa	Chihuahua		Chihuahua.
Bullion	do	J. B. Mastesson	Do.
Big Chief	Negro Hill	E. L. Baker	Breckenridge.
Bunker Hill	do	R. A. Sankey	Do.
Boss	Crystal Lake		Do.
Black Prince	do		Do.
Big Bonanza	do		Do.
Billy	do	W. F. Hooper	Do.
Black Eagle	Snake River		Do.
Broadway	do		Do.
Belle East	do		Do.
*Bonanza Gold and Silver Mining Company	Jack Mountain	T. J. Sweeney	Ten Mile.
Ballarat Mining Company	Ten Mile	H. A. W. Tabor	Do.
*Champion Mining Company	Montezuma	W. H. Spencer	Montezuma.
*Cashier	do	do	Do.
*Central Fluming Mining Company	Lincoln	Calvin P. Clark	Lincoln City.
*Colonel Sellers	Elk Mountain	Lowe & Ellis	Ten Mile.
*Crown Point	Ten Mile	L. B. Parker	Do.
*Cunard Mining Company	Mineral Hill	—— Proctor	Breckenridge.
*Chatauqua	Snake River		Do.
*Cincinnati	North Mineral Hill		Do.
*Colorado Springs Mining Company	Fletcher Mountain		Ten Mile.
Crœsus Mining and Smelting Company	do	D. T. Mitchell	Do.
Champion Tunnel	Eagle River		Red Cliff.
Colomar Mining Company	Red Peak		Frisco.
Cumberland Mining and Milling Company	Snake River	B. A. Whiteman	Breckenridge.
Cooper Mountain Mining and Milling Company.	Ten Mile	A. McKensie	Wheeler.
Castle Dome	do		Robinson.
Clinton	Eagle River	W. W. Burr	Red Cliff.
Continental Mining Company	Ten Mile		Kokomo.

List of mines in Colorado—Continued.

SUMMIT COUNTY—Continued.

Name of mine.	District.	Owners or managers.	Post-office address.
Crescent Mining Company	Ten Mile		Kokomo.
Cassia	Jack Mountain		Ten Mile.
Cumberland	Nigger Hill		Breckenridge.
Colorado	Mineral Hill		Do.
Copper Queen	Crystal Lake	Stanley & Finnegan.	Do.
Colorado and New Mexico Tunnel	Mineral Hill		Do.
Colorado Mint	Taylor Hill		Do.
*Delaware and Commodore Mining and Milling Company.	Decatur	Jacob F. Cypher	Decatur.
*Diantha	Augustine	S. Powell	Breckenridge.
*Delaware	Peru		Do.
*Discovery	Blue River	John Shock	Do.
Dillon Mining Company	Ten Mile		Dillon.
Dorsey	do	J. S. Wheeler	Wheeler.
Dragon Tunnel	Chihuahua		Chihuahua.
*Eagle and Raven Consolidated Mining Company.	Ten Mile	John Gleason	Ten Mile.
*Elephant	Nigger Hill	Henry Farncomb	Breckenridge.
*Eagle Bird Consolidated Mining Company.	Battle Mountain	D. D. Belden & Co.	Red Cliff.
*El Capitan	Red Cliff	G. Eisenbies	Do.
Euclid Avenue	Mineral Hill		Breckenridge.
E. R. Y	Eagle River		Red Cliff.
Enterprise	Ten Mile	J. D. Morrissey	Kokomo.
Empire	do		Do.
Eureka	Montezuma		Montezuma.
Engleside	Bartlett Mountain		Ten Mile.
Elkhorn	Nigger Mountain	H. H. Brown	Breckenridge
Emma	Mineral Hill	J. Stockham	Do.
*Fuller Placer Mining Company	Snake River	J. L. Fuller	Do.
*Fredonia	Argentine	C. I. Hayes	Do.
*Fischer Gold and Silver Mining Company	Ten Mile	B. T Hitchcock	Kokomo.
*Felicia Grace	do	Hall, Mayer & Co.	Robinson.
Frisco Discovery and Mining Company	do	C. T. Shield	Frisco.
Forest Consolidated Mining Company	do		Kokomo.
Fox Lake	Yuba Dam		Breckenridge.
*Gold Park Mining Company	Holy Cross	W. W. Turney	Gold Park.
*Gray Eagle Consolidated Mining Company.	Ten Mile	A. J. Woodside	Ten Mile.
Grey's Peak Mining Company	Montezuma		Montezuma.
Gem City Mining Company	do	T. E. Cleary	Do.
Great Eastern	Holy Cross	Jos. W. Watson	Gold Park.
Great Western	do	do	Do.
Grand View Consolidated Mining Company.	Ten Mile	Peter F. Hook	Kokomo.
Good Hope Consolidated Mining Company.	Decatur		Decatur.
Gate Mining and Milling Company	Ten Mile		Frisco.
Georgia	Snake River		Breckenridge.
Germania Mining Company	Ten Mile		Kokomo.
Gold Hill Mining and Smelting Company	do		Do.
Gibsonville Mining and Milling Company	do	B. M. Newcomb	Wheeler.
Grand Union Mining Company	do		Robinson.
Golden Comet	Eagle River		Red Cliff.
Governor Group	Snake River	Jas. W. Kennedy	Breckenridge.
Golden Wave Mining and Milling Company.	Holy Cross	Peter Murtagh	Holy Cross.
Grub-stake	Gibson Hill	Fanning & Stayley	Breckenridge.
Graham and Marsh Mining Company	Yuba Dam	Graham & Marsh	Do.
Grand Trunk	Holy Cross		Gold Park.
Governor's Group	Upper Blue		Breckenridge.
*Hunkidori	Montezuma	A. P. Penery	Montezuma.
*Highland Chief	Ten Mile		Ten Mile.
Horseshoe	Battle Mountain		Red Cliff.
Hunkidori	Holy Cross		Gold Park.
Hildebrand	Mineral Hill		Breckenridge.
Harrison	Montezuma		Montezuma.
Highland Mary	Eagle River		Red Cliff.
Huron	do		Do.
Homestead Mining Company	Ten Mile	J. S. Wheeler	Wheeler.
*Ida L	do		Ten Mile.
*Idalia Silver Mining Company	do	Frank M. Woods	Do.
*Inter Ocean	Jack Mountain	Lafontaine & Brown.	Do.
*I. X. L	Swan	W. R. Farran	Swan City.
Indianapolis	Ten Mile		Robinson.
Ida May	do	J. S. Wheeler	Wheeler.
Iron Mask	Robinson		Robinson.
*Kingfisher	Battle Mountain	O. H. Harker	Leadville.

List of mines in Colorado—Continued.

SUMMIT COUNTY—Continued.

Name of mine.	District.	Owners or managers.	Post-office address.
Kokomo Mining Company	Ten Mile		Kokomo.
Kokomo Bell	....do		Do.
Kokomo Giant	....do		Do.
Keystone	Nigger Hill		Breckenridge.
Kansas Chief	Holy Cross	W. A. Casswell	Holy Cross.
*Little Chief	Eagle River		Red Cliff.
*Lincoln City Mining Company	Lincoln	J. K. Gooding	Lincoln City.
*Lawrence Tunnel	Chihuahua		Chihuahua.
Little Chicago	Sheep Mountain	Thos. Gowenlock	Ten Mile.
Little Ella	....do		Do.
Little Lee Group	Lenawee Mountain		Decatur.
Leadville and Pennsylvania Consolidated Mining Company.	Decatur		Do.
Lennox Mining Company	Ten Mile	W. A. Shaw	Kokomo.
Lucky	Mineral Hill		Breckenridge.
Lancaster	Snake River		Do.
*Michigan	Ten Mile	Hopewell Mining Company.	Ten Mile.
*Milo	... do	John Gleason	Do.
*Monarch	Glacier Mountain	Worthington, Morgan & Co.	Montezuma.
Montezuma Silver Mining Company	Montezuma		Do.
Metal Mining and Milling Company	....do		Do.
Mark Twain	....do		Do.
Mayflower	Ten Mile		Ten Mile.
Matchless	....do		Do.
Mayflower Mining Company	....do		Kokomo.
Mercantile Mining Company	....do		Do.
Mammoth Mining Company	Chihuahua		Chihuahua.
Medius	... do		Do.
Millard Ives Mining Company	....do	W. H. Townsend	Do.
Mary Isabel	Eagle River		Red Cliff.
Mass. and Colorado Mining Company	Ten Mile		Robinson.
Mineral Hill Mining Company	Mineral Hill	A. G. Hooper	Breckenridge.
Mount Nebo Mining Company	Snake River		Do.
Mountain Lion	Crystal Lake		Do.
Minnehaha	Battle Mountain	Berkshire Mining Company.	Red Cliff.
*North Star	Upper Blue		Breckenridge.
*New York and Summit Mining Company.	Peru	Wm. St. John	Swan.
*New Northwestern Group	Chihuahua	O'Connell & Duncan.	Chihuahua.
New York	Snake River		Breckenridge.
Nettie B. Forest	Sheep Mountain	Geo. Trimble	Ten Mile.
*Ontario	Lincoln	G. Murphy & Co.	Lincoln City.
Old Timer	Montezuma	Van Dyke & Bennett	Montezuma.
Ohio Boy	Tennessee Pass		Coopers.
Oatez	Chihuahua		Chihuahua.
Occidental	Decatur	Aldrick & Brown	Decatur.
*Piqua Mining Company	....do		Do.
*Paymaster	....do	H. M. French	Do.
*Papoose	Battle Mountain		Red Cliff.
*Porphyry Castle	Chicago Mountain	Dr. Howe	Breckenridge.
Pioneer	Horn Silver Mountain.		Red Cliff.
Peruvian	Decatur	Aldrick & Brown	Decatur.
Parole Consolidated Mining Company	Ten Mile	Chas. D. Moore	Robinson.
Prince	Eagle River		Red Cliff.
Peacock Mining Company	Head of Blue		Breckenridge.
Pride of the West	Snake River		Do.
*Queen of the West	Jack Mountain	Recen & Gaff	Ten Mile.
*Queen of Sheba	Snake River		Breckenridge.
*Robinson Consolidated Mining Company	Ten Mile		Robinson.
*Rochester Queen	Swan	Allison Bros. & Miller	North Swan.
*Ryan Gulch Placer	Blue River		Breckenridge.
*Revenue	Snake River		Do.
*Reconstruction	Copper Mountain	—— Thompson	Ten Mile.
Rose of Breckinridge	Blue River		Breckenridge.
Rob Roy	....do		Do.
Royal Mountain Mining and Milling Company.	Ten Mile	Wm. Graff	Frisco.
Rose	Eagle River	H. A. Plimpton	Red Cliff.
Ruby Silver Mining Company	Chihuahua		Chihuahua.
*Royal George Mining Company	Decatur	J. B. Hewitt	Decatur.
*Saint John's Mining Company	Montzuma		Montezuma.
*Silver King	... do	J. H. Bartlett	Do.
*Shock Hill Mining Company	Shock Hill	Shock & Co.	Breckenridge.
*Spirit	Battle Mountain	J. W. Williamson	Red Cliff.

List of mines in Colorado—Continued.

SUMMIT COUNTY—Continued.

Name of mine.	District.	Owners or managers.	Post-office address.
*Snow Bank	Sheep Mountain	Wilson & Strong	Ten Mile.
*Salt Lake Placer	Blue River		Breckenridge.
*Saint Louis Boy	Carbonate Hill	John Galligher	Do.
*Selma	Jack Mountain	L. D. Kneeland	Ten Mile.
*Silver Boom	Yuba Dam	E. J. Stiles	Breckenridge.
Saint John	Snake River		Do.
Star of the West	do	J. A. Harvey	Do.
Silver Wave	Ten Mile	D. D. Belden	Ten Mile.
Silver Ledge	Horseshoe	J. B. Hewett	Chihuahua.
Sheep Mountain and Ten Mile	Ten Mile		Ten Mile.
Saville	do		Kokomo.
Silver Blossom	do		Do.
Stockholm	Eagle River		Red Cliff.
Star	Horseshoe		Chihuahua.
Saint George Tunnel	do		Do.
Saint Cloud	Montezuma		Montezuma.
Silurian	Eagle River		Red Cliff.
Snow Drift	Snake River		Breckenridge.
Spotted Tail	do		Do.
Stockholm	Holy Cross		Gold Park.
Silver Thread Group	Copper Mountain		Ten Mile.
Sallie Barber	Nigger Hill	Geo. T. Metzger	Breckenridge.
Silver Crystal	Crystal Lake	E. L. Baker	Do.
*Tiger	Montezuma		Montezuma.
*Tornado	Ten Mile Range	A. G. Hooper	Breckenridge.
*Triangle and Golden Edge	Sheep Mountain	J. K. Loomis	Ten Mile.
Tiger	do	Geo. Trimble	Do.
Topeka	Peru		Breckenridge.
Tame Deer	McBarnes		Do.
Thunderbolt Consolidated Mining Company.	Ten Mile		Kokomo.
Tiffin Gold and Silver Mining Company	do		Preston.
Trophy	do		Robinson.
Ten Broeke	Sheep Mountain	Frank M. Woods	Ten Mile.
Tabor Sheep Mountain Mining Company	do		Robinson.
Union Consolidated Mining Company	Ten Mile	P. J. Ware	Kokomo.
Vermont and Colorado Mining Company	do		Do.
*White Quail	do	J. B. Lovell	Ten Mile.
*Wheel of Fortune	do	Ryan Bros	Do.
*Warrior's Mark Mining Company	Mineral Hill	J. K. Loomis	Breckenridge.
*Waterman	Snake River		Do.
*Washington	Nigger Hill		Do.
Windsor	do		Do.
Wellington Tunnel	Mineral Hill		Do.
Wheeler Mountain Consolidated Mining Company.	Wheeler Mountain	J. H. Burke	Wheeler.
Wilson Mining and Smelting Company	Blue River		Breckenridge.
Wabash Mining and Smelting Company	Ten Mile		Kokomo.
*West Side Lode	Fletcher Mountain	J. B. Lovell	Do.

CHAPTER XII.

WYOMING.

To Mr. G. E. Bailey, Territorial geologist of Wyoming, I am indebted for information respecting the mining interests of this hitherto undeveloped section of country.

Wyoming in the past has held but a low rank in the list of the States and Territories producing the precious metals. From its location, however, surrounded as it is by gold and silver bearing districts, we would naturally expect that deposits of ore carrying the precious metals would exist within its large extent of territory. Dakota on the east, Montana on the north, Idaho to the west, and Utah and Colorado to the south have all for a number of years added largely to the gold and silver production of the country.

The main range of the Rocky Mountains extends across Wyoming from southeast to northwest, and the Big Horn, Wind River, and Medicine Bow Mountains, with the Black Hills, lying partly in this Territory and partly in Dakota, offer inviting fields to the prospector. The portion of the latter range in Dakota has contributed from three to four millions annually to the resources of that Territory. That similar deposits exist in Wyoming is known to those who are familiar with the Territory, but there are several reasons why the facts are not known to the people generally.

Although gold and silver were discovered years ago by the goers and comers between the Atlantic and Pacific slopes, yet until recently the Territory has been recognized as the stronghold of powerful and warlike Indian tribes, who have compelled not only the abandonment of work begun, but also an almost total cessation of prospecting through Central and Northern Wyoming between the Black Hills and the Big Horn River.

A few years ago, following upon the subjection of the Indians, the stock business assumed such proportions that the Territory gained the reputation of being fit only for raising cattle and possessing but meager attractions for the miner.

Wyoming has also suffered from a lack of means of communication with its best portions. The Union Pacific Railroad, in order to secure easy grades and low passes, was laid south of the best mineral belts and in fact runs through the poorest and most unproductive regions. Colorado, Idaho, and Montana, being easier of access and practically free from Indians, have attracted enterprise and capital that otherwise might have found a field in Wyoming, and while the former have made and offered inducements for speedy settlement, the latter has made but slight effort to advertise her resources.

Owing to these causes the mining that has been done has been but poorly done by men without either the necessary means or requisite knowledge. The production of gold and silver has not increased during the last two or three years, owing to incompetence and inexperience of mining superintendents and officers of companies who were to a large extent engrossed in other business.

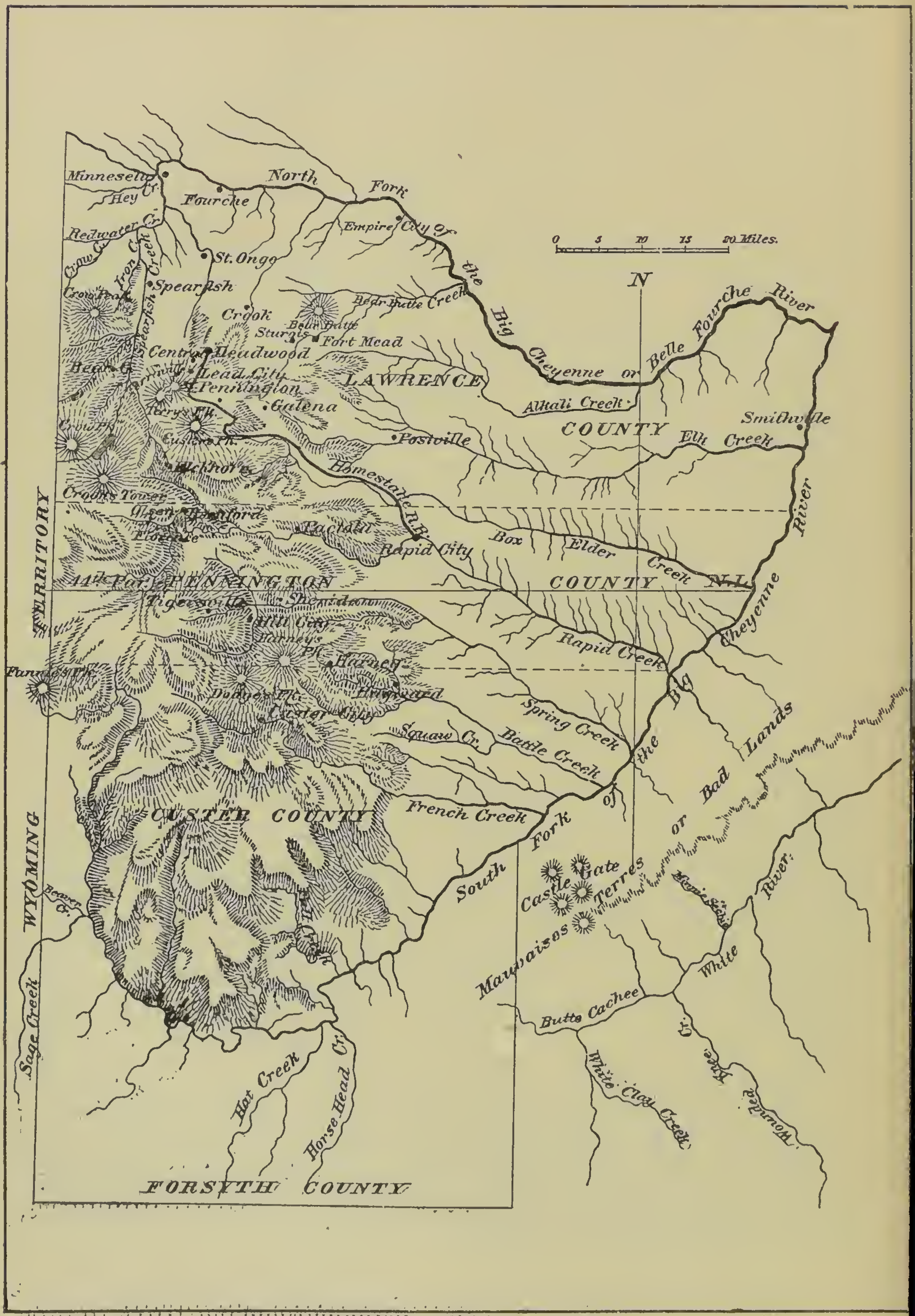
As in other and more productive sections of country, the overstocking of mines and scattering the stock in small lots among the community has also crippled operations. The great needs now are intelligent prospectors, competent superintendents, and systematic development of the known valuable properties by close corporations. Wyoming possesses unusually excellent facilities for mining and for the reduction of her ores. Wood and water are abundant, the natural roads are excellent, and coal is found in vast beds in every county. During the latter part of the year more interest has been manifested, owing to the success of the copper smelter and the Cummins and Keystone mills, and there is a good outlook for the next year. Already much preparatory labor has been performed and money expended in developing properties, building mills, &c., but some time, perhaps a year, must elapse before profitable returns can be reasonably expected, but it will not be long before Wyoming will take a permanent place as a producer of the precious metals.

Ex-Governor J W. Hoyt, at one time State geologist of Wisconsin, in his last message says: "I know of no region in the United States in which gold appears so widely dirtributed as in Wyoming, and I cannot doubt that eventually numerous mines of much value will be worked, thus placing this great Territory, so rich in other resources, among the most important of the gold sections. We are now where Colorado was fifteen years ago. A few fortunate strikes may serve to give Wyoming a similar impetus and start it on the high road to a remarkable development. We have many mines that already yield handsome returns whenever the requisite combination of energy and skill with sufficient capital can be brought about."

The following is a list of the mineral patents applied for in Wyoming:

Mine.	District.	Applicant.	Date.
Home Placer	Douglas Creek	Home Placer Company	May 19, 1879
Blue Jay	do	Blue Jay Company	Do.
Keystone	do	S. W. Downey	Do.
Liberty Placer	Cummins	W. A. Cooper	Jan. 15, 1880
Deserted Treasure	Seminole	Thos. Sun	Dec. 1, 1880
Emmeletta	do	do	Do.
Hollsburg and Slattery	do	Isaac Fieldhaus	Jan. 11, 1881
Spring Creek Placer	Douglas Creek	S. W. Downey	Feb. 22, 1881
New York and Wyoming Placer	do	A. S. Blackburn	Feb. 28, 1881
Home Placer	do	S. W. Downey	Mar. 1, 1882
Rochester Placer	do	Jacob Howe	Mar. 27, 1882
Florence	do	L Z. Farewell	Mar. 29, 1882
Gold Eagle	Bramel	Gold Eagle Company	July 28, 1882
Gold Blossom	do	L. V. Burnham	Do.
Gen. Miles	do	Jelm Mountain Company	Do.
Silver Mountain	do	do	Do.
Bradley	do	William Bradley	Nov. 20, 1882.

Most of the gold mined during the last year was by individual work in placers or with small mills, and the actual output is therefore difficult to ascertain. During the fiscal year ended June 30, 1882, the deposits at the United States mints from Wyoming amounted to $4,410.63, and during the calendar year 1882 to $2,454.95. The total production for the year may be placed at $5,000.



BLACK HILLS OF DAKOTA TERRITORY.

CHAPTER XIII.

DAKOTA.

The gold and silver mines of Dakota are situated in the western part of the Territory, between the North and South Forks of the Cheyenne River, and are embraced in a region extending southward from the 45th parallel, about 100 miles in length, and 50 miles in width. The Black Hills, in which these mines are found, are mountainous elevations "rising from the plains like islands in the sea," lying partly in Wyoming and partly in Dakota, between the 43d and 45th parallels of north latitude and the 102d and 105th meridians of west longitude. The hills are covered with forests of pine and intersected by rapid rivulets and deep ravines, and occasionally inclose grassy valleys and parks covered with luxuriant vegetation. The outcropping formation below the foothills is slate; above that, in successive order, are beds of limestone, magnesian rock, granite, and slate.

In the northern part gold is found in ledges as well as in placers. The veins as a usual thing are of considerable width and filled with low-grade ores cheaply mined and easily worked. Some of the ledges are reported to extend 70 miles in length. The trend of the auriferous and argentiferous veins is from north to south. Rapid Creek and its tributary, Castle Creek, rise in the limestone formation west of the hills, flowing eastward; have cut their way through the mineral veins which contain the original deposits of the precious metals, and have produced rich placer mines in the valleys below, into which the slower currents have dropped the precious metals the waters carried down.

The principal streams that rise in the hills are the Elk, Rapid, Spring, Battle, French, and Beaver Creeks, which empty into the south fork of the Cheyenne, and the Bear Butte, Whitewood, Spear Fish, and Redwood Creeks, principal tributaries of the north fork.

The principal placer mines are located on French, Battle, and Spring Creeks and their tributaries, but the working of these mines has been retarded by the lack of water.

A ditch to carry water from Cold Springs to Nigger Hill, a distance of 40 miles, is now being constructed for the purpose of working the ground. The richest placer mines which have been worked are located in the Deadwood, Whitewood, Gold Run, and Bobtail Gulches, which appear to have been worked as far as they can successfully be by the usual methods of sluicing. Great difficulty has been experienced for want of sufficient water. The Bear Butte Creek runs through a region rich in silver mines, from which the production thus far has been about $150,000. The ores, although of high grade, are found in disconnected localities, and no well-defined veins have as yet been developed. Seven or eight miles above Deadwood, bars and banks of auriferous gravel, rich in gold, are found in the bed or on either side of Whitewood Creek, as it debouches from the hills.

Around Central City and Lead City are quartz ledges.

From the mines of the Homestake Company, ore has been extracted for hundreds of feet across the formation, and their limit has never been reached.

There are many locations in the hills, equal in extent and as valuable as the Homestake, still undeveloped, only awaiting capital for their development.

The secret of the success of the belt mines of the Homestake group is in the magnitude of their ore-beds and in the inexpensive method of mining and milling their ores, which costs less than $1.50, and lately only 80 cents per ton. These mines have declared regular dividends on low-grade ores averaging only from $4 to $5 per ton.

A 100-stamp mill will crush 3 tons to the stamp every 24 hours, and as the ore is easily and cheaply mined, a profit upon the investments in these mines is surer than that in veins of ore assaying into the thousands. Gold is found in nearly every gulch and hill within the mineral belt, and gold mining is carried on from Custer City on the south to Bear Gulch on the north, a distance of 90 miles, and from Rockerville on the east to Rochford on the west.

The following mines in the Black Hills are reported to have declared dividends in 1882, viz: Homestake, $512,000; Deadwood-Terra, $330,000; Father De Smet, $170,000. Besides these, many private corporations and persons whose earnings and profits are not reported are taking out large amounts of bullion, and appear to be profitably employed.

The ore from the mines in the Black Tail Gulch has kept 145 stamps running; 60 in the Esmeralda, 20 at Cassel's, and 20 at Dorrington's mills, the last named having been supplied with ore from the Minerva mine.

Hydraulic mining in the Black Hills was carried on in a more systematic manner during the year, and more successfully, than at any previous period. The season was favorable on account of the early and long-continued rains, which furnished abundance of water for hydraulic mining; flumes and ditches were constructed, costing thousands of dollars, and so far as known the enterprises were judiciously located, and promise the projectors large and speedy returns for their investments of capital and labor.

In the vicinity of Rockerville are mostly placer deposits of auriferous cement, and from the bars and gulches in the neighborhood half a million dollars' worth of gold has already been taken. At Sheridan, on Spring Creek, the fissure vein is reported to be over 100 feet in width, of solid but refractory ore, containing copper, gold, lead, and silver.

The prices of the products of the country are as follows: Corn, $2 per bushel; oats, $1; potatoes, $1; onions, $2.50; flour, $5 per hundredweight; eggs, 35 cents per dozen; butter, 40 cents per pound; groceries, about 5 cents per pound more than in Chicago; day board $25 per month; with lodging, $35.

Wages of farm hands, $35 per month; teamsters, $40 to $50 per month; day laborers, $3 per day; mechanics, from $5 to $6 per day. Money from 18 to 30 per cent. per annum.

The following statement is an estimate of the comparative costs and results of operating a 100-stamp and 20-stamp quartz mill:

Expenses per day of running one hundred stamps.

12 cords of wood per day, at $5	$60 00
2 amalgamators, at $4 each	8 00
2 helpers, at $3.50 each	7 00
4 feeders, at $3.50 each	14 00
4 rock-crushers, at $3 each	12 00
2 engineers, at $4.50 each	9 00
2 firemen, at $3 each	6 00
1 foreman, at $6.50	6 50

2 laborers, at $2.50 each	$5 00
Wear and tear, oil, quicksilver, &c	20 00
Total	147 50
50 men in mine, including superintendent, clerks, &c., at an average of $4	200 00
Total expense of mine and mill	347 50
300 tons of ore reduced	900 00
Expenses	347 50
Net profit	552 50

Expenses per day of running twenty stamps.

3 cords of wood, at $5	$15 00
2 engineers, at $4 per day	8 00
2 feeders, at $3.50	7 00
3 rock-breakers, at $3	9 00
1 amalgamator, at $4	4 00
Wear and tear, oil, quicksilver, &c., per day	6 50
Total	49 50
Five men in mine, at $4 per day	20 00
Total expense of mine and mill	69 50
40 tons of ore reduced, at $3 per ton	120 00
Expenses	69 50
Net profit	50 50

It is assumed that the ore is transported from the mine to the mill by a tramway, at the cost of from 5 cents to 10 cents per ton.

The following is a list of the districts and principal mines sending ores to the Denver Exposition of 1882:

Whitewood district.—Gold mines: Homestake, Giant and Old Abe, Highland, Golden Gate, Father De Smet, Erin, Uncle Sam, Cheyenne, Gustin, Durango, Black Tail, Woolley, Pecacho, and Black Pine.

Bald Mountain district.—Gold and silver mines: Tecumseh, Humboldt and Oregon, Bolivia, Maggie, Blue Bird, Beaver, Penobscot, Little Rock, Lucy, New Era, Huxley, Marshall and Confidence, Decorah, Trojan, Perseverance, and Enterprise.

New Carbonate camp.—Silver mines: War Eagle, Hannibal, Utica, Hartshorn.

Galena district.—Silver mines: Sitting Bull, Washington, Red Cloud, Montana, Indian Queen, Silver Queen, Little Fannie, Escondido, Emma, Custer, El Refugio, General Merritt.

Spruce and Two Bit Gulches.—Gold mines: Oro Cache, Anna, Ophir, Wilmington, Silver Glance, Chipmunk, Julian and Gilman, Diamond, Lady Maud, Neptune, Noble Grand, Albany.

Silver mines: Comstock, Wisconsin, and Sherman.

Castle Creek.—Gold mine: Fairview.

As heretofore, the principal portion of the production of the Territory has been from the group of mines in the vicinity of Deadwood, the yield for 1882 of the three counties embracing the mineral belt being estimated as follows:

County.	Gold.	Silver.	Total.
Custer	$200, 000	....	$200, 000
Lawrence	2, 950, 000	$175, 000	3, 125, 000
Pennington	150, 000	....	150, 000
Total	3, 300, 000	175, 000	3, 475, 000

The principal information relating to Dakota mines and districts was obtained from correspondents in the Black Hills, whose communications and statistics have been grouped and freely used.

The maps of the Black Hills and of the several counties comprising that region were prepared by Mr. E. M. Stoeber, of my office, and will be found useful in locating the districts and many of the mines described.

LAWRENCE COUNTY.

This county lies in the southwestern portion of the Territory, and is bounded north by the North Fork of the Cheyenne or Belle Fourche River, east by the South Fork of the Cheyenne, south by Pennington County, and west by Wyoming Territory. Its principal creeks and tributaries to the Cheyenne are Spear Fish, Whitewood, Bear Butte, Alkali, and Elk.

The western portion, within the limestone belt of the country, is divided into the mining districts of Whitewood, Bald Mountain, Deadwood Greenwood, Galena, New Carbonate or New York, Spruce, and Two Bits, and also contains a part of Rochford district.

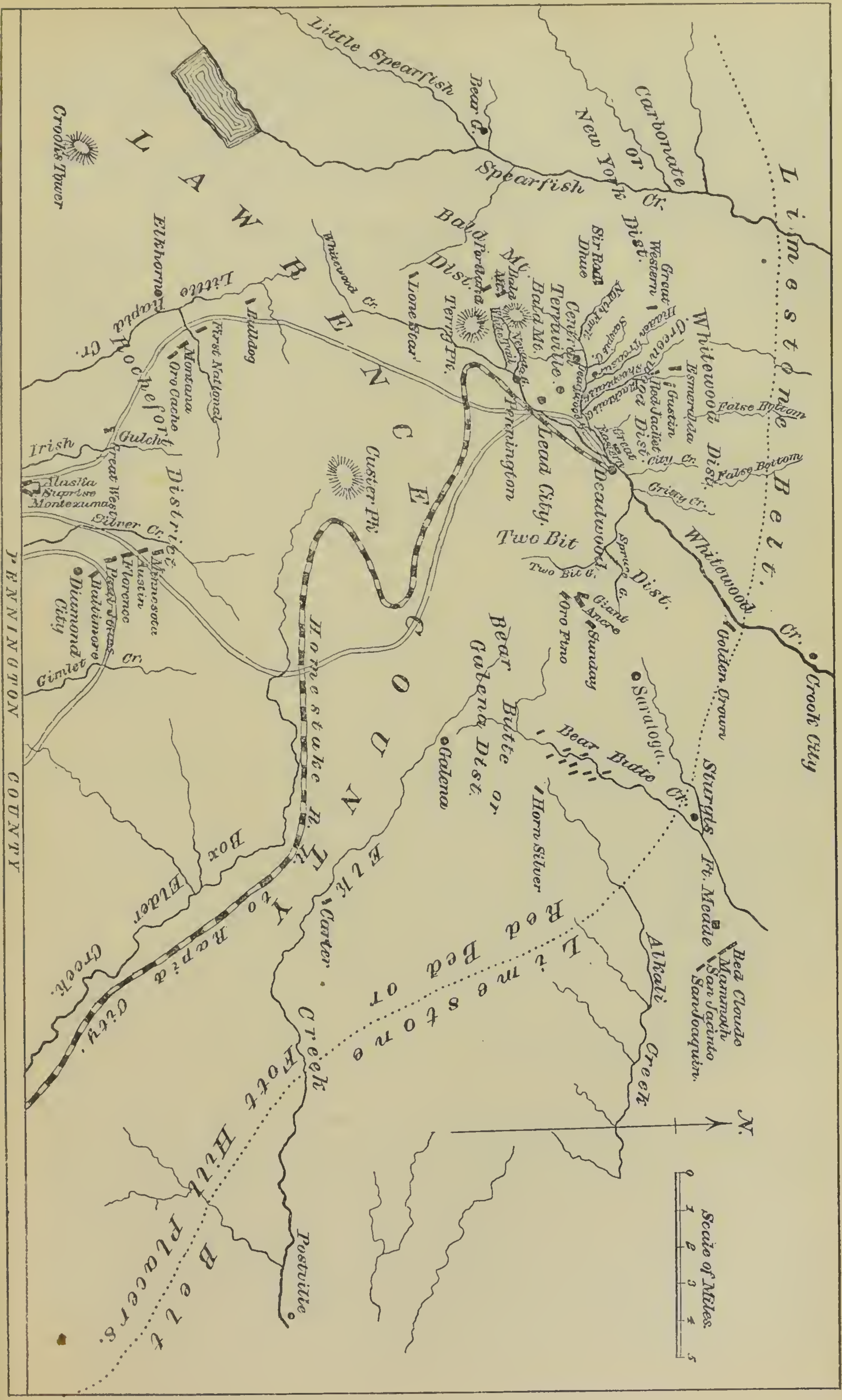
The *Whitewood district* comprises the group of mines known as the Gold Belt, on which the Homestake, Deadwood-Terra, Father De Smet, and others are situated. Extending from the belt mines in a northwestern direction are wide blanket veins of cement, rich in gold. These veins follow the slate for bed-rock and are capped by porphyry rock. Through them run numerous channels, like the beds of ancient streams, along which this cement, a conglomerate of quartz, pebbles, and other rock, is often found in beds from 15 to 20 feet in thickness. One large channel, on which the Lancaster Company is working, is seen in the hill between Deadwood Creek and Black Tail Creek, and seems to have come from the vicinity of the De Smet.

All the hillsides below the porphyry line are covered with float cement, which in the gulches below is mixed with gravel, decreasing in quantity as the stream descends. Similar cement conglomerate is found in Pennington County.

The mines of the Homestake group have been constantly worked throughout the season. A railroad track runs from the mills to the mines, and an extension of the road has been surveyed to Rapid City, 62 miles distant. About 25 miles of this new track is now completed and used for conveying timber to the mines. The ore is handled economically and thus permits a profitable treatment of low-grade ores with satisfactory results. A body of paying ore, reported to be at least 100 feet long by 70 feet wide, and 100 feet deep, in an open cut between the Highland and Homestake mines, was, after the necessary precaution to guard against accidents and destruction of property, thrown down at a single shot. The ore, amounting to hundreds of thousands of tons, was thus economically broken up, a greater part ready for the shovelers, and requiring but a few shots in the bowlders too heavy to load upon the cars. The production of this mine during the year has been at the rate of about $100,000 per month.

The Homestake Company have under contemplation the erection of a new 120-stamp mill. The superintendent expresses no doubt of his ability to keep this and the present mills going for years.

From the De Smet mine, belonging to the same company, ore has been extracted and milled at the rate of from 300 to 400 tons a day; 10,500 tons of ore mined and milled in May yielded $39,459.83 in bullion. The financial statement of this company for May shows how economi-


LAWRENCE COUNTY
PENNINGTON COUNTY
Limestone Belt
Limestone Red Bed or Foot Hill Placers Belt
Little Spearfish
Bear G.
Spearfish
Carbonate or New York Cr. Dist.
Crook's Tower
Elkhorn
Little Rapid Cr.
Bald Mt. Dist.
Whitewood Cr.
Lone Star
Terry Pk.
Bald Mt.
Terraville
Central
Esmeralda
Justin
Red Jacket
City Cr.
Whitewood Dist.
False Bottom
Gritty Cr.
Lead City
Deadwood
Pennington
Two Bit
Two Bit G.
Spruce G.
Dist.
Giant
Acme
Oro Fino
Sunday
Saratoga
Bear Butte or Galena Dist.
Galena
Bear Butte Cr.
Horn Silver
Whitewood Cr.
Crook City
Golden Crown
Sturgis
Ft. Meade
Red Cloude
Mammoth
San Jacinto
San Joaquin
Alkali Creek
Custer Pk.
Homestake R. R. to Rapid City
Elk Creek
Carter
Postville
Box Elder Creek
Rochford District
Bulldog
First National
Montana
Oro Cache
Irish Gulch
Alaska
Surprise
Montezuma
Great Western
Silver Cr.
Minnesota
Austin
Florence
Baltimore
Diamond City
Gimlet Cr.
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cally the ores of this mine are treated, and how successfully ores of very low grades can be worked. The expenses of the month were $19,443.71, showing that ores containing less than $4 per ton bullion can be worked at a net profit of $2 to the ton. The north end of the tunnel in August was in 742 feet, and at the close of the year the mine was in good order, the mill running well, and several drifts being driven.

The Deadwood-Terra has produced during the season an average of $50,000 worth of bullion. In June it declared its nineteenth dividend of 45 cents per share, or $90,000.

The total production of the Homestake group is reported as follows:

Homestake	$1,114,568
High Lode	20,000
Deadwood-Terra	551,052
Father De Smet	417,873

The gross bullion yield of the Homestake Company was, up to December 31, 1879	1,051,265 58
For January, 1880, it was	78,569 65
For February, 1880, it was	84,868 20
For March, 1880, it was	90,159 23
For April, 1880, it was	104,281 13
For May, 1880, it was	118,463 31
For June, 1880, it was	123,413 03
For July, 1880, it was	128,768 96
For August, 1880, it was	144,980 43
Total to September 1, 1880	1,924,769 52

PRODUCT OF BELT MINES.

Gross product up to and including July 31, 1882.

Homestake Mining Company produced (Tons of ore milled, 684,733; average per ton, $6.37.)	$4,367,180 48
Highland Mining Company produced (Tons of ore milled, 234,081: average per ton, $5.02.)	1,175,632 45
Deadwood-Terra Mining Company produced (Tons of ore milled, 249,329; average per ton, $4.90.)	1,221,946 57
Deadwood Mining Company produced before consolidation of Deadwood-Terra Mining Companies	834,192 28
Golden Terra Mining Company produced before consolidation of Deadwood-Terra Mining Companies	788,054 62
Giant and Old Abe Mining Company produced before consolidation with Homestake Mining Company	72,469 34
Father De Smet Mining Company, from January 1, 1878, to August 1, 1882, produced (Tons of ore milled, 343,894; average per ton, $5.74.)	1,974,640 36
Total product (Average of 1,512,037, $5.78 per ton.)	10,434,116 10

Mr. McMaster's reports give some interesting figures. He states as follows:

"The average gross yield of the ore to June, 1879, was $9.69 per ton. Since then it has been found of advantage to extract and mill all the rock between the walls of the veins. This has lowered the grade of the ore somewhat, but the gross amount milled has been increased in greater proportion, while the cost of mining has been correspondingly reduced. The yield of the ore from September, 1879, to February, 1880, varied from $4.25 to $5.60 per ton. Since that date it has been increased by the ore of higher grade extracted from the 100-foot level, and now averages $7.95 per ton."

DIVIDENDS PAID.

Homestake, 47 dividends	$1,512,500
Father De Smet, 21 dividends	540,000
Deadwood-Terra, 20 dividends	740,000
Deadwood before consolidation	275,000
Terra before consolidation	75,000
Belt mine dividends	3,142,500
Total assessments	400,000

The Caledonia shows two distinct veins, or lodes, about 95 feet apart, one called the Discovery and the other the Caledonia. The mine has been opened by a cut 150 by 100 feet on the east side, and 800 feet of tunnel on the west. A winze has been sunk on the Discovery vein and a vertical shaft underneath the open cut on the Caledonia, both starting from the main tunnel.

The ore hitherto worked contained hornblende and talc slate, but at present the drifts and shafts are in hard rock. Large chambers of ore were found in both veins. One chamber on the Discovery was 60 feet in width, but at 300 feet south of the tunnel became reduced to 10 feet. North of the tunnel the ore was of low grade and became poorer in quality as the work extended upward.

On the Caledonia vein to the north of the tunnel, a chamber 84 by 78 feet has been excavated, and on the south 42 by 60 feet. The ore extracted from the chambers gave $5 per ton on the sill floor, and $3 at the top, and was sufficient to employ the 60-stamp mill belonging to the company from the 15th of November of the previous year until the following April, 1882, with constant work. About 11,000 tons were taken in the first two months of that period from the open cut.

Of the Durango mine, the Deadwood Pioneer of the 3d of June speaks as follows:

"It is located about half a mile west of the Homestake mine, on the north side of Main street, Lead City. The mine is nothing but a wash, which here for a distance of about 200 feet long by 20 feet wide has accumulated in pockets of a gold-bearing cement. There is no sign of a vertical vein in the tunnel run, and the bed-rock is as zigzagged as forked lightning. Wherever this bed-rock pitches can be found gold, and here was where miners were led to believe a true vein had been found. It only took about 6 feet of digging to convince them of the fallacy of the idea. As the tunnel was run to the north it encountered a hill, and barren rock was struck. This is easily explained: The miners had got beyond the pocket, where, at some period in the past, the gold had been accumulated by a running stream."

The Gustin mine, belonging to the Lancaster Mining Company, has been furnishing sufficient ore to keep both its mills in operation during the season.

The Esmeralda mine is located opposite the Gustin mine, and has a large body of ore extensively developed, yielding an average of $5 to the ton, and sufficient to keep a 60-stamp mill constantly in operation.

The ore taken from the Cheyenne during the summer was crushed at Cassell's mills.

Near the Cheyenne is the High Lode, from which a production of about $20,000 is reported, in February, 1882, to have been taken from eleven tons of its ore, previously reduced at Cassell's mills. The High Lode extension, the Golconda, and the Goldfinch were at the same date reported to have produced from $22,000 to $32,000 bullion.

Near the Cheyenne Consolidated Gold Mining Company are located the Grant, Conway, Financial, Anchor, Moose, Aleck, Grand Deposit, Baltic, Brigham, Corinne, Utah, Laramie, and numerous other locations which have been worked to a greater or less extent, under great disadvantages, but the work has developed the fact that the whole hill is a mass of gold-bearing rock, assaying $6 per ton.

The Savage tunnel has been run under the crest of the divide, between Gold Run and White Creek, over 700 feet, striking the ore-body in the Rattler at an angle of 500 feet below the surface. This tunnel will give an outlet for the ore in the Grizzly, Althea, Washburn, and Big Cheyenne.

Deadwood district.—A reporter of the Black Hills Post visited the I. X. L. mine, belonging to the Western Reserve Mining Company, and gives the following information:

"A shaft building 20 by 40 feet was erected this summer, and contains a Boss engine and hoister which works smoothly. The vein pitches south. Total depth of main shaft, 130 feet. Fifteen feet from bottom a level has been driven 18 feet west and will be continued, to open up excellent stoping ground. At this point the crevice is 3 feet wide, of good iron; the shaft is 3 feet in width. The drift east at a depth of 105 feet is in 70 feet, and about 30 feet from the shaft, where two veins unite, the crevice is fully 6 feet wide, composed of milling and smelting ore. Above this level there has been some stoping done, and 3 men are now employed on this work, the production being about a cord per day. The crevice in this raise for 50 feet is in no place less than 2 feet in width, and in one place opens out to 10 feet, all pay dirt. A shaft was sunk 20 feet east of the shaft-house, to connect with this raise, and at a depth of 40 feet the workmen encountered a pocket of rich dirt which pans gold freely. While the reporter was in the mine, a blast fired off at a depth of 80 feet in the raise exposed a body of iron finer looking than any before discovered. The character of the dirt sent to mill is such that considerable loss is entailed, as it carries a large per cent. of silver and copper. The mill runs return from 3 to 4 ounces of gold per ton. A late assay of smelting material gave a return of 1.68 ounces of gold, 50 ounces of silver, and fully 10 per cent. of copper."

The assays made from the ore taken from the 18 inch vein upon the Enterprise mine gave 800 ounces of silver and .77 gold, and 57 per cent. lead.

The North Star group of mines, consisting of claims for a mile south of the Homestake group, have developed a number of open cuts tunnels, and shafts during the last summer. One tunnel, over 100 feet in length, is milling over $4 per ton, nearly the whole distance, without any sign of either hanging wall or foot wall.

Galena or *Bear Butte district*, located on Bear Butte Creek and its tributaries, is the oldest silver-mining district in the Black Hills. Systematic work was commenced in 1879, but has since been developed with great energy. The production of silver bullion during the year 1882 was reported at $232,400 in silver and $650 in gold.

At the Oro Fino mine, under the charge of Superintendent Van Sycle, the company have worked 28 men, 17 (including the superintendent) at the mine, 7 at the mill, and 4 hauling and cutting timber. The vein lies north, and ore has been taken from a shaft less than 50 feet deep. The gold bullion product of the July run was valued at $45,000. The width of the ledge is claimed to be about 45 feet.

Red Cloud mine, now the property of the Fort Meade Mining Company, was worked, running three shafts. Twenty wagon loads of base bullion, worth, including lead, $56,000, were taken from a ten days' run of the Sitting Bull smelter, in March; $20,000 of silver is reported as the production for the year 1882.

The Highland Chief mine, in the *Galena district*, has let a contract to run a 50-foot tunnel.

The Uncle Sam is on Elk Creek. It has 2 shafts, one 150 and the other 100 feet in depth, and a tunnel 150 feet. From a run of 15 days in a little 1-stamp prospecting mill belonging to the company, $237.69 gold and $1.56 silver were taken out, which yielded at the rate of a little over $1,500 per ton, and during the season over $4,000 were cleared, panning out as high as $100 per day. At the depth of 100 feet the lode of high-grade milling ore is about 30 feet in width.

The Sitting Bull mine produced considerable bullion, which was shipped by cars from the mine to its 30-ton smelter. Fifteen thousand ounces of silver bullion milled from low-grade ores were taken from the mine, and 100 tons of base bullion were produced, which contained, besides lead, 46,000 ounces of silver and a small quantity of gold. A ten days' run in March gave 80,000 pounds of base bullion, worth $8,000. Besides the ores treated by the smelter, considerable milling ore was taken out and reduced at the Florence stamp mill. A few days' run in September yielded bullion to the value of $18,000, and from a November run five silver bricks weighing 1,000 ounces each, and assaying from 950 to 997 fine, were produced and sent eastward. A portion of the bullion output of the Sitting Bull smelter was the product of high-grade galena ores received from other mines, among which were 50 tons of ore from the Red Jacket mine. It is reported that the yield for the year 1882 was $200,000 in silver and $650 in gold.

The Yellow Jacket, Merritt, Flagstaff, El Refugio, and Red Jacket have all yielded a small amount of silver, during the year 1882 aggregating about $1,400 each.

Greenwood district is situated on Box Elder Creek, in the central portion of the hills. The streams occupying this belt are the Deadwood, the Black Tail, and the Hidden Treasure Creeks, flowing in a northwesterly direction through blanket veins of cement or conglomerate rich in gold.

The ore found in this district is mostly chloritic slate, containing free gold and lying in large bodies. It can be milled at a nominal cost, and is about the same grade as that in the other parts of the hills. Wood and water are abundant, and can be utilized at little expense. Box Elder Creek carries water enough to run 6,000 stamps, and the hills on the other side are covered with an abundance of pine. The mines in the district have thus far been but slightly developed by shafts averaging 100 feet in depth and tunnels of 50 feet.

Bald Mountain district.—This district comprises an extensive silver belt, on which operations were retarded during the summer on account of the scarcity of water. A project is under way to construct a narrow-gauge railroad down Grant Cañon to the reduction works in the district.

The Portland Mining Company made developments on several ledges, showing large bodies of silver ore carrying some gold and considerable lead. They have erected a mill and chlorination works having a daily capacity of 30 tons, and have recently purchased the Trojan group of mines, and expect to produce large quantities of bullion.

The company's 20-stamp pan mill was dependent for water upon springs having their sources on the property of the company, which are found by actual experience to furnish an amount sufficient for experimental work during the season. An ineffectual attempt was made to collect bed-rock water by running drifts. Expenditures to the amount of over $1,000 were made in the development of the mine and construction of ditches to procure a supply of water for a mill, with the expectation that the rock could be treated at a cost not exceeding $9 per ton. The ore, however, though of high grade silver and gold bearing rock, was found to be refractory, requiring different treatment from ordinary quartz, and the company were unable to extract bullion sufficient to pay expenses.

Ore taken from the Bald Mountain mine has assayed $26 to $30 in gold.

The Lone Star mine has been developed with a cut 170 feet long, upon a flat deposit of ruby silver and black sulphurets, samples of which have assayed as high as 177 ounces per ton. The mine is located south of *Bald Mountain district*, near White Tail Creek.

In *Carbonate district*, about 8 miles west of Deadwood, very extensive veins of carbonate have recently been discovered; showing ore of a high grade, and producing as high as from 500 to 1,000 ounces of silver and from 60 to 80 per cent. of lead. These mines have not been producing in great quantities but are being rapidly developed, and will soon be among the valuable producing mines of this region. A large number of ledges have been discovered, on which developments have been made, and from present indications this camp is likely to become prominent in the Black Hills.

The Collingwood, Belleview, and Tail of the Comet have shafts sunk from 15 to 90 feet deep, but no production of bullion has as yet been reported. In this region are located the War Eagle, Ratler, West Virginia, and Wilkinson. At Colorado City, in the Silver Monument, White Signal, Last Rose of Summer, Hard Scrabble, and Sailor Boy, is found considerable ore of a rich quality, but little work has been done. The Sailor Boy was sunk 100 feet and abandoned for the want of water. A piece of rock from the bottom of the mine assayed $42 to the ton.

Two Bit district is a gulch near Spruce Gulch, in the neighborhood of Deadwood City. The ores are of high grade, containing some silver. The principal locations are on almost horizontal ledges. The head of the gulch is no doubt bordering on the Galena Silver Belt, as float of of galena, rich in silver, is found deposited in its crevices.

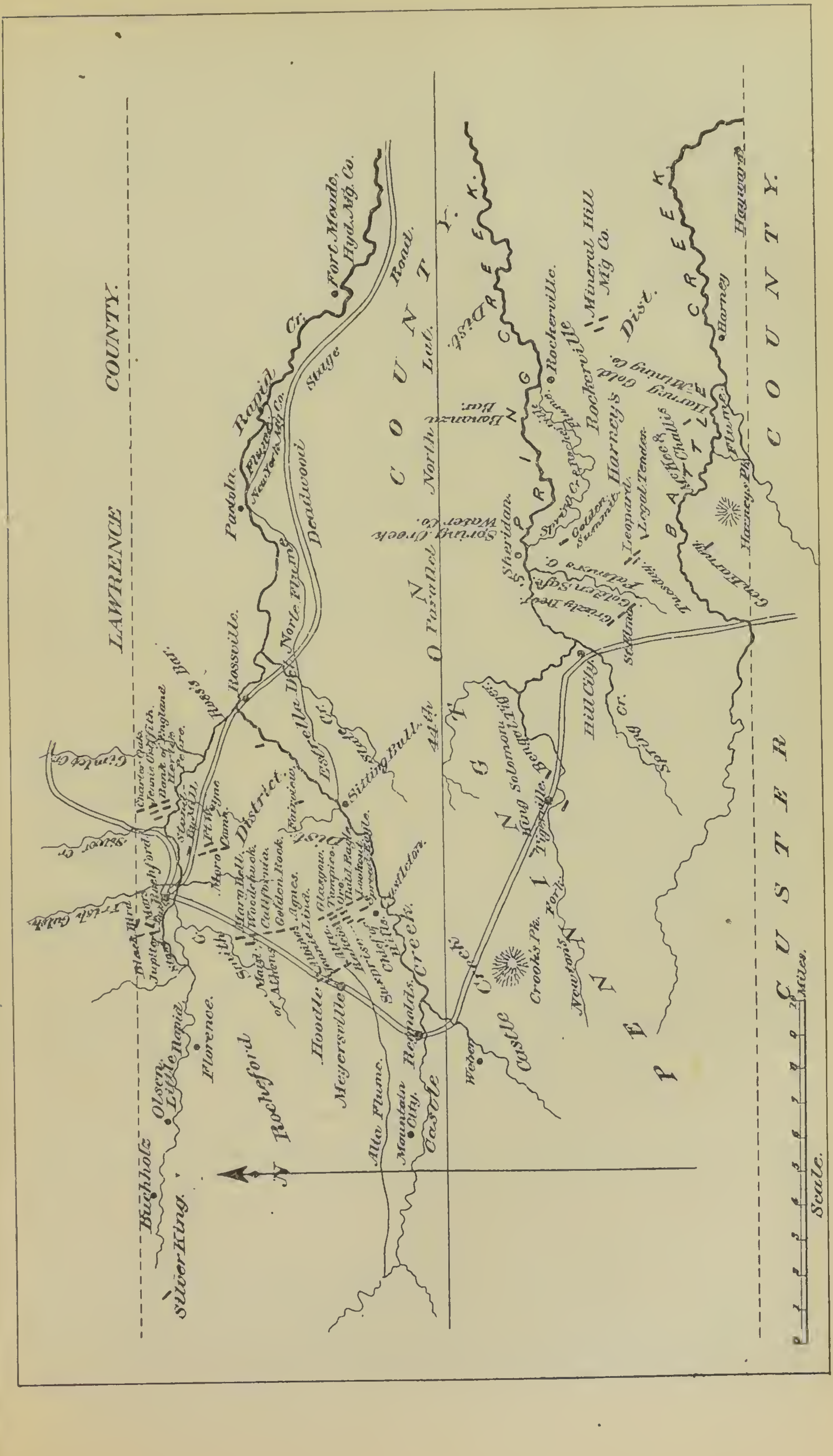
The Noble Grand mine shows ore assaying $20 per ton. The 20-stamp mill for this mine is nearly completed.

The ores of Spruce Gulch, which are milled at Deadwood, about half a mile from Deadwood City, are of a high grade, but are not found in such large masses as in the Homestake belt. The veins are supposed to have been formed by sedimentary deposits, of which there appear to be two beds, one lying about 100 feet below the other. The Oro Cache, Anna, and Ophir are located in this gulch, on the lower vein.

PENNINGTON COUNTY.

This county lies in the southwestern portion of the Territory, and is bounded on the south by Custer County, east by the South Fork of the Cheyenne River, north by Lawrence County, and west by Wyoming Territory. The principal creeks flowing into the Cheyenne are the Rapid, Spring, and Battle Creeks.

The western half of the county is mountainous and rough, but rich in precious and other minerals. Some of the most valuable placer mines of Dakota are situated along the foot hills of the belt. The ore is low grade, but free milling and abundant, and the facility and cheap-


LAWRENCE COUNTY.
PENNINGTON COUNTY.
CUSTER COUNTY.
Rapid Cr.
Fort Meade Hyd. Mg. Co.
Pactola.
Deadwood Stage Road.
Rochford District.
Rockerville Dist.
Harney's Dist.
Hill City.
Sheridan.
Rockerville.
Mineral Hill Mg. Co.
Harney.
Harney's Pk.
Spring Creek.
Castle Creek.
Crook's Pk.
Newton's Fork.
Spring Cr.
Florence.
Silver King.
Alta Flume.
Mountain City.
Reynolds.
Meyersville.
Hoodle.
Sitting Bull.
Rossville.
North Lat.
44th Par'lled
Scale.
Miles.

ness of its extraction and treatment render these mines valuable and guarantee a prosperous future for this district, the country being well watered and timbered.

W. H. N. Maguire, editor of the Pick and Plow, of Rapid City, gives the following description:

"The last year there were probably 200 miners engaged in placer mining, in the summer months—working under great disadvantages—and the average per capita could not have been less than $750, making the total yield $150,000. But it must be borne in mind that all this mining work was of the most primitive kind—wheeling gravel a long distance down from the higher bars to the creeks to wash. For this reason, no adequate idea of the extent and richness of the placer deposits of the Black Hills can be formed from what they have actually yielded to date. The deposits are of immense extent, embracing many thousands of acres, the gravel in places being over 50 feet in depth, and carrying some gold from the top down. It is believed a thousand miners will be employed for many years working the placers of Rapid and Castle Creeks, beginning with the completion of the flumes and ditches that will bring water over all the bars at a sufficient elevation for hydraulic mining. Aside from the vast bars of auriferous gravel lying immediately along the banks of Rapid and Castle Creeks, embracing many thousands of acres, the 'Red Bed' or foot-hill placers embrace a 'wash' extending in a northerly and southerly direction from Elk Creek to Spring Creek, a distance from 15 to 18 miles, and having an average width of 2 miles. Good gold prospects are found at all points in this immense belt of washed gravel; the poorest would rank with the best present hydraulic diggings in California, and good 'dumps' abound. All this ground will eventually be covered by the Upper Rapid Creek water rights of the Estrella del Norte Mining Company."

Rapid Creek (the Castle, its principal tributary, being the main and central current of the Black Hills) is the only source of supply for water for the placers of Pennington County; but its volume is never less than 3,000 miners' inches in the dryest season. Every inch of it, from the head of the Castle to the debouchure of the main current from the eastern foothills, has been appropriated, and within the next three years will be actually utilized by the Estrella del Norte Company—one of the strongest organizations of Eastern mining capitalists--when the gold yield of the Black Hills will be immensely increased and American placer gold mining will probably assume something like the importance it held in former years.

There are in Pennington County many very promising gold veins, some of vast extent, but they have not yet been developed to a producing condition. The gold yield from them will undoubtedly be very great in the near future. Responsible companies have been organized for the development of some of these veins.

At the head of Castle Creek, in Pennington County, are found vast bodies of copper ores, the result of 44 assays of ore from the Wall Street and Equator mines, showing an average of 31.7 per cent. copper. These ores are generally in carbonates, and smelt very readily without the introduction of foreign fluxing material.

The gold yield of Pennington the present year has been small, probably not over $150,000, as the Upper Rapid Creek flumes were just completed when the cold weather set in. The yield for the year was principally from the Rockerville placers, 12 miles southwest from Rapid City, and the Harney Hydraulic Company's ground in Grizzly Gulch, about 7 miles southwest from Rockerville. Though the Harney Company only ran 3 months, the returns were satisfactory. They will begin the next season's operations with more extensive working facilities.

Rockerville placer mining district is situated 15 miles southwest from Rapid City, in Pennington County. It is on the eastern edge of the slate formation and adjoining the limestone which encircles the hills. Some of the gulches have cut through the limestone and worked into that formation. It is on high table land lying about 200 feet higher than Spring Creek, which runs through a deep cañon about a mile north. Mr. Fred. J. Cross says of this district:

"There is no stream of water running through the district, though there are a few small springs on Rocker Gulch, which by damming furnishes a little water, and in wet seasons with the surface water will furnish sufficient for sluicing part of the time.

"The water for working to any extent has to be brought by ditches and flumes. The past season was very favorable for mining. There was water enough, and in some places miners were driven out of deep diggings by it.

"The Black Hills Gold Placer Mining Company completed in 1881 a good substantial flume about 16 miles in length, which takes the water out of Spring Creek and conveys it into the district at a height sufficient to allow it to be distributed to all parts, no gulch or bar lying so high but that the water from this flume can be carried to it. In 1881 a company was formed, called the Rockerville Bed-Rock Flume Company, which secured the right of way through all claims on Rocker Gulch for the construction of their flume, and secured also some good claims on the gulch. They have built quite a length of flume, in some places going some depth into the bed-rock, and, by driving a tunnel through a rocky point at a sharp bend in the gulch, have secured a good dump for their tailings and fall enough to their flume so that everything runs clear. This flume has been in use the past season, but no clean-up was made.

"These two companies are now consolidated, or under one management, under the name of the Spring Creek Water Company, and they sold water to miners at reasonable rates the past season, when they had more than they could use on their own work. This has stimulated miners to work, and the camp is in quite a prosperous condition. There is much unprospected ground still lying idle, that might pay well if properly worked. No new discoveries have been made or new ground opened for the last two or three years, the mining all being done on old ground which has been worked since 1877 and 1878. The principal gulches are Rocker, Coulson, Captain Jack, Phinney, Sankey, Henderson, and Ninny, which with their tributaries, all carrying gold, and some of them very rich, cover a large tract of country.

"The Bonanza Bar Company is a new corporation formed during the past season, to work Bonanza Bar, which is on Spring Creek, about a mile north of Rockerville. They had considerable work to do building flume, digging ditch, &c., before they could commence work, and only got a little hydraulic work done when the season closed, but enough to show that their ground is good, it paying well for the time that they worked.

"But little attention is paid to quartz mining in Rockerville district, though development work is being quietly done on a few locations.

"The Mineral Hill Mining Company own a location which is situated about the center of the district, and is a quartz cement, carrying very rich ore. Developing work is being done, showing the ore-body to be quite extensive. August Behren has been almost constantly at work on a vein of quartz near Rockerville, which shows good ore, carrying silver. Colonel Wright has a location on a vein which crosses Spring Creek, near Bonanza Bar, on which he has done some work. It carries gold, and specimens showing free gold are found."

In the Rockerville Basin are hundreds of acres of gulches, bars, and reefs of auriferous cement, from which a million worth of gold has already been mined.

The Golden Summit mine is located on the divide between Spring Creek and Palmer's Gulch, about 4 miles south of Sheridan. The mine has been developed by an open cut about 35 feet below the surface, and at that depth the ore has been found to be of astonishing richness. On the surface the rock resembles that of the Grizzly Bear, being hard and flinty. At the bottom of the workings the rock is of a bluish-gray color, similar to the specimens taken from the Salmon mine in Custer County. Tests of the rock across the width of the vein have given very large returns. The richness of the ore has attracted much attention. It contains a large amount of free gold. In former years rich rock was found in the vicinity of Spring Creek and Palmer's Gulch.

Mr. Thomas F. Wardner, who visited the Golden Summit, writes that "the vein on the mine has been traced for over 500 feet by the surface croppings, and its shaft is down 25 feet. On the top, the outcroppings are of a whitish cast, and the vein is but a foot in width, but at the depth reached by the shaft it is over 4 feet in width. An open cut reveals the same character of quartz as that found in the shaft. The rock at the lowest point is remarkably solid." It is his estimate that the ore will mill from $2,000 to $20,000 per ton.

They are erecting a 10-stamp mill which will soon be ready to drop the stamps.

Mr. William Rosenbaum, of Sheridan, superintendent of the Golden Summit mine, says a company of capitalists are developing the Golden Summit, and are now erecting a new 10-stamp mill for prospecting purposes. A vein of ore 4 feet thick and producing an average of $20 to the ton is being worked. Some of the ores go as high as $600 to the ton.

The Bengal Tiger is located near Hill City, on Spring Creek, and exhibits some very rich ore-bearing quartz wired together with strings of gold. The owners are unwilling to allow their mine to be examined or give any information as to its production. Mr. Rosenbaum says the Bengal Tiger has a shaft 85 feet deep. He does not know the width of the vein, but the ore is marvelously rich.

The Saint Elmo is but slightly developed; the vein is about 10 feet in width, with a hanging wall of trachyte formation and foot wall of slate. The ore assays from $5 to $100 per ton.

The King Solomon mine is owned by Boston capitalists, who contemplate erecting a 100-stamp mill this summer. The shaft is now 224 feet, and drifts 100 and 200 feet are in large beds of ore. The Deadwood Times says of this mine that the company has found a body of good-paying ore, upon cross-cutting on the 200-foot level. A force of 40 men was employed in and about the mine. The ore in the cross-cut is reported to have assayed as high as $700 to the ton.

The other locations, with the exception of the Bengal Tiger and the Golden Summit, are still owned by the discoverers, and capital has not yet taken hold of them. These are being developed, and the miners are living from what gold they obtain by pounding out the rock in small mortars and panning out the gold.

As yet no bullion of any consequence has been taken out, but with the erection of mills this part of the hills is destined, at no distant day, to become one of the gold-producing sections of the country.

At the head of Palmer's Gulch, about 4 miles south of Hill City, is Grizzly Bear, on the same range and 2 miles northeast of the latter. This property is also in a comparatively undeveloped state. Concerning this mine the owners, Messrs. Rogers and Clark, state that in an open cut the vein shows to be about 30 feet deep, the ledge to be 19 feet wide, and to prospect well throughout. From this vein they have taken out expenses for working the mines during the three years they have been there, their only appliance for crushing having been a hand mortar. They are at present sinking on the quartz of this mine. After passing through the ledge there appeared to be another body of quartz dipping into the hill, and a tunnel was started towards it, which is in a distance of 60 feet, through hard, blasting ground.

On the Tuesday, an adjoining claim, they have two tunnels: No 1 is in a distance of about 55 feet, through quartz that would pay well for milling; No. 2 tunnel is in a distance of 100 feet, through hard ground.

The following information was received from Messrs. Homans and George Hughes

The Black Hawk and May Queen group in Pennington County was located and has been worked by Messrs. Homans and George Hughes since January 1, 1882. A 100-stamp mill will be erected as soon as possible.

The Black Hawk assayed $62.80 in gold from the very top, and the lowest assay from any of the rock taken out of the main shaft was gold, $12.41, silver $1.44, and lead 8 per cent. An iron cap cutting through the lode, and some 6 to 8 inches thick, assayed $14.90 in gold and $1.15 in silver per ton of 2,000 pounds.

The May Queen is estimated by the purchasers to have 2,000 tons of good milling rock on top of the ground. No assays of the Black Hawk and May Queen group fell below $12.41 in gold.

Another location, the Deer Creek lode, owned by the same gentlemen, assayed $9.20 and $10.70 to the ton, with slight traces of silver and copper. The rock in the shaft is mixed with plumbago.

Messrs. Homans and George Hughes own in addition 3 other locations which they say would require hundreds of stamps without sinking a shaft. All of these claims are located so that they can be connected by side tracks and turnouts with a main track to Rapid Creek, where the mills will be erected, less than 2 miles from the farthest claim, and at points where the supply of water is from 500 to 2,000 inches.

The names of the following mines of *Palmer district*, with the values of their ores, are given by Mr. Rosenbaum, viz:

	Per ton.
Golden Summit	$20 00
King Solomon	12 00
Bengal Tiger	85 00
Grizzly Bear	48 00
Saint Elmo	10 00
Cross	8 00
Columbia	20 00
Grand Junction	7 00
Penobscot	10 00
Bullion	10 00
Emma	25 00

Harney district.—This district is situated on Battle Creek, about 8 miles southwesterly from Rockerville. Placer mining has been carried on from the first settlement of the country, but no work of any magnitude was commenced until within a year, when the Harney Gold Mining Company was organized, which secured all the old claims for a long distance on the creek as well as a number of high bar claims. They built in the past year about 6 miles of flume, bringing the water of Grizzly Gulch and Battle Creek on to Mitchell Bar, where it was used quite successfully the past season for hydraulic purposes, and washed off a large part of this bar. They also extended their bed-rock flume for quite a distance below Harney, and constructed 2 miles of flume to be used for hydraulic work in connection with the bed-rock flume. These flumes were little used during the past season, as the company directed their attention to the work on and above Mitchell Bar. After the close of the placer working season, quite extensive prospecting work was started in the bed of Battle Creek between Mitchell Bar and Harney. A shaft was sunk and bed-rock struck at depth of 30 feet. From the bottom of the shaft drifts were opened both ways, crossing the bed, one of which penetrated about 45 feet, the other not so far, getting fair prospects. Cold weather coming on, work was suspended for the winter. Water was encountered in the gravel and on the bed-rock, and necessitated the use of large steam-pumps, delaying the work as well as making it quite expensive. On completion of the prospect, it is announced that the company, if they find pay sufficient to warrant it, will put in a bed-rock drain, or complete their bed-rock flumes. For the first time bed-rock has been touched on the creek in the upper part of the district.

In the *Cross Quartz mining district*, quartz mining did not in the past year command much attention, the miners being attracted from the precious metals to mining mica, the desposits of which in this district are quite extensive. A number of companies are engaged taking out mica, and many miners have suspended prospecting on their own account for gold and silver, to work for wages, or to prospect for mines of mica on their own account. A few have kept steadily at work successfully prospecting for or developing locations. Among these are Vieregg, Engle & Co., doing business under the name of the Grand Island Company. They have run a tunnel over 100 feet on the Hoo-doo location and penetrated a vein of gold-bearing quartz with fair prospects. When completed, the tunnel is expected to tap the main vein at a depth of about 100 feet from the surface. They have also worked on the Quincy, Little Grace, and Chief, adjoining.

Fred. J. Cross has been working most of the time on the Thompson, Cross, and Warren locations, of which the Cross shows a quantity of very fair ore, free gold being quite frequently found. The greatest amount of development work is on the latter location, and consists of a shaft 40 feet deep, from the bottom of which a cross-drift is carried 75 feet, and a tunnel which intersects the cross-drift is 100 feet in length. All workings are in ore.

The Columbia, owned by Mitchell, Franklin, Madill, and others, which is situated on Battle Creek, has not been worked since last March, but when work was stopped was showing good ore, carrying some free gold.

The Bullion, owned by the same parties, and situated near the former, has not been worked for some time, but is a large and promising vein.

The Legal Tender lode, owned by McKee and Challis, is situated on Battle Creek above the mouth of Grizzly Gulch. On this location considerable work has been done, showing rich gold ore. The same parties own a number of other locations in the vicinity.

This district is crossed from northwest to southeast by a belt of quartz veins nearly a mile in width, many of which show good ore, although little work above the annual assessments, and in many locations not that much, has been done upon them.

The Cross Company's 20-stamp mill on Barronett Gulch has been idle for over a year, from a want of water sufficient to run all the stamps, as well as a want of proper management.

Rochford mining district.—This district is partly in Pennington and a portion in Lawrence County, and contains some valuable mines. It has a greater area than any other district in Pennington County, and a larger number of quartz mines. The mountain range of the Black Hills between Custer and Harney's Peak, the highest elevations in the hills, runs through the district.

On the two principal streams flowing through the district, Castle and Rapid Creeks, placer mining is still carried on to some extent by private individuals, who took from these placers in 1882 but little more than $5,000. Larger returns will be reached as soon as men of capital can be induced to invest in these mines and employ hydraulic machinery.

Mr. F. W. Von Bodungen, of Rochford, says of the district, "The quartz mines of Rochford district produce gold, silver, and copper, the veins are mostly large, being often as wide as 50 and even 100 feet, running in a northwesterly and southeasterly direction and having an inclination or dip to the eastward. The walls generally consist of slate."

In the neighborhood of the town of Rochford, which is situated at the confluence of Irish Gulch and Little Rapid Creek, are many well-developed mines which prospect high in gold. One of the oldest and most developed is the Stand-By mine, associated with the Moro and Como and Fort Wayne. A 60-stamp mill, run by water-power, is built on the Stand-By mine.

The Alaska, owned by Hayward & Company, on Irish Gulch, has a tunnel of nearly 500 feet in length, and the ore from the shaft was tested in its 20-stamp mill and gave a satisfactory result.

West of the Alaska, and adjoining, is situated the Montezuma, owned by Mr. Rochford, who is one of the oldest prospectors and the originator of this camp. In this mine an immense ore-body is encountered, of which every pound prospects.

On the west side of Irish Gulch, nearly opposite the above-named mines, is a mountain of ore, prospecting well, embraced in the Jupiter, Mars, and Blackbird, owned by Von Bodungen and Nowlan; and farther north the Great West, owned by Coleman, Dumphey and Tilson. Considerable work has been done on these latter claims, especially on the Jupiter, the ore of which prospects high, frequently showing free gold.

Fish Gulch contains sufficient water to run 40 stamps, and Rapid Creek, with over 500 miner's inches of water, being only one-half mile distant, is a sufficient guarantee that the above-named mines can and will be worked at a low figure in a short time.

One mile east, and parallel with Fish Gulch, runs Silver Creek, emptying into Rapid Creek, with many valuable mines in its neighborhood.

The Minnesota belt, embracing the Minnesota, Austin, Florence, Paul Jones, and Baltimore, is one of the richest belts in this district. Considerable work has been done on all these claims for the last four years, and the ore of the same averaged as high as $7 per ton. A 20-stamp mill is located on the Minnesota mine, and the probability is that extensive operations will take place with that property in the spring of 1883.

The Minnesota mine is located at the head of Bemiss Gulch, about a half mile from Silver Creek. The width of the ledge has not been ascertained. The croppings can be traced for several miles east and southwest. The ore is reported to average $7 per ton. The gold vein on which it is located shows solid masses of auriferous quartz from 40 to 100 feet across. It is now being vigorously developed. The owners of this mine purchased the Stand-By mine and mill, running from 10 to 20 stamps. The ore was easily mined, two men taking out 25 tons per day. The owners have contracted to deliver from 80 to 100 tons of ore, beginning on the 1st of January.

It is contemplated to build a railway to the Stand-By mine from Little Rapid Creek, that the ore may be crushed by water-power.

Southwest of Minnesota belt is situated the cluster of mines belonging to the Garfield Mining Company, organized in April, 1882, by Chicago parties. It embraces the Charter Oak, Virginia, Bank of England, Columbia, Garfield, Chicago, Lincoln, Herlech, Queen of the Valley, King of the Valley, Boston, Jackson, Negaunee, and Gold Bug. The capital stock of the company is $2,000,000, divided into 200,000 shares at $10 each.

Considerable work was done on most of the mines of the company in 1882, and the different ore tests partly received from their own prospecting mill, and also from other mills, showed an average result of $7 per ton. If the water on Silver Creek is properly accumulated from bed-rock 100 stamps may be fed with ore from these mines.

The Garfield Mining Company is developing the Charter Oak and two new mines, the Jennie Griffith and the Bank of England, which show large bodies of free milling ore. One of the mines has a shaft 50 feet in depth, and samples of the ore are reported to have assayed $12 gold and $4 silver to the ton.

The Charter Oak has been developed by a tunnel 30 feet in length and the Bank of England by a shaft and open cut, in which is disclosed a well developed vein of ore 60 feet in width. The ore is running from about $5 per ton. The Charter Oak has purchased the old Manville mill for removal to their mines, which gives the company altogether 30 stamps.

The next cluster of mines worthy of mention are the Montana mines, embracing the Montana, Oro Cache, and First National, owned by Dumphy & Co. These mines are situated near the camp of Elkhorn and close to Rapid Creek; they have been extensively worked for five years.

On Castle Creek a group of valuable mines has been located, the principal of which are the Chief of the Hills, owned by Boyle & Co.; the Lookout, Rakein, Tampico, Glasgow, and Spread Eagle, owned by Cooms, Hooper and Ayer; and the Plow Boy, Golden Eagle, and Elgin, owned by Van Fleet. These mines prospect as high as $10 to the ton.

Southwest of the town of Rochford, on Smith's Gulch, a tributary of Rapid Creek, and near the town of Meyersville, some valuable gold mines are located.

The Alta mine belongs to a company from Iowa. The ore has been worked with good result in their 60-stamp mill, situated close to the town of Meyersville. The water is conducted to the mill by a flume from Castle Creek, a distance of 7 miles.

East of the Alta, are situated, the Jennie Lind, Alvina, Abbie, and Hoodoo lodes, on all of which extensive developments are being made by the owners, Messrs. Lary & Meyer.

Farther north and east are the California, owned by Hughes & Co., the Golden Rock, Mary Bell, Woodchuck, Maid of Athens, and the

Guerdon, owned by Careio. Some of these latter mines have exhibited wonderfully rich ore, especially the California, the ore of which went as high as $1,000 per ton.

There may be many mines in this district as valuable as the above mentioned, but these are the most developed.

Castle Creek district.—Placer mining in this district has only received the attention of a few miners in the past year, most of the miners of the district having been employed by the Estella del Norte Company in constructing their flume.

The Castle Creek Placer Mining Company, a new coroporation organized the past season, did not get their arrangements perfected in time to commence work. It is the intention of the company to run a bed-rock drain to carry off the water from the bed-rock, where, by previous prospecting with steam pumps, it has been ascertained that there are rich deposits of gold, but there being such a large amount of water, work could not be prosecuted without a drain. In this district there are many very promising veins of quartz upon which development work is being done.

The Estella del Norte Company has completed a system of flumes and ditches 8 miles long on Castle Creek and Rapid River, where there are thousands of acres of gravel deposits of great depth and richness. From their junction to Kelly's Bar but little gold was taken out.

Fair View Mine, on Castle Creek, is perhaps the best defined ledge of ore in the Black Hills, except the Homestake mines. It is not very extensively developed as yet, but when worked to its full capacity will perhaps be one of the most valuable mines in the Black Hills. The vein of the Fair View is from 40 to 60 feet in width, from which the owners are each making from $3 to $5 per day, pulverizing the ore in a druggist's mortar. The shaft has been sunk about 100 feet. This mine was first located and worked upon a cement deposit from which, more than 2 years ago, the ore was exhausted. In the winter of 1881 a true vein was struck below the cement, from which the mill is again suppiled.

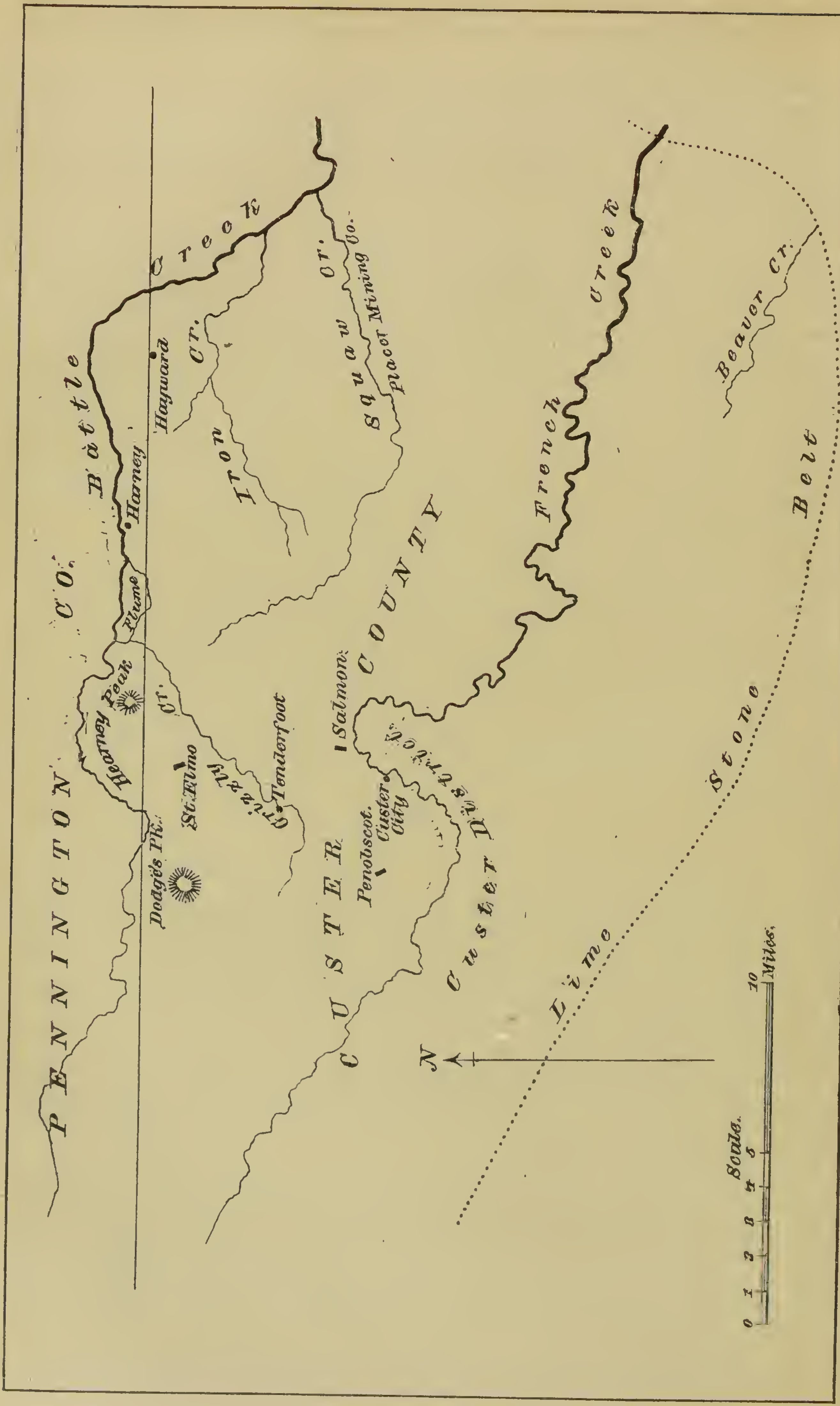
CUSTER COUNTY.

This county is in the southwestern portion of the Territory. It is bounded on the north by Pennington County, east by the South Fork of Cheyenne River and the bad lands of Cheyenne Indian reservation, south by Forsyth County, and west by Wyoming Territory. Its principal mining is on the placers of French and Battle Creeks and their tributaries; but ore of fine grade carrying free gold is extracted from the mines near Custer City.

The production of gold bullion from deep mines during the year 1882 amounted to $134,000, and from placer mines to $18,000.

Hayward district.—This district is situated on Battle Creek about 8 miles south from Rockerville, and like that district is on the eastern edge of the slate formation.

The Battle Creek Placer Mining Company own extensive works here having a number of miles of well-built, substantial flume, which conveys the water of Battle and Iron Creeks on to Mameluke Bar, where with the very best of appliances it is effectually used for hydraulic purposes. This bar, one of the heaviest deposits of gravel wash on Battle Creek, is situated about 75 feet higher than the creek. This gives a dumpage not excelled anywhere in the hills. Six to eight thousand dollars have been taken out since the commencement of the work. The company have abundance of water, in fact, four times as much as


PENNINGTON CO.
Battle Creek
Harney
Hayward
Cr.
Iron
Squaw Cr.
Placer Mining Co.
Flume
Harney Peak
Cr.
St. Elmo
Grizzly
Tenderfoot
Dodge's Pk.
Salmon
CUSTER COUNTY
Penobscot
Custer City
Custer District
French Creek
Beaver Cr.
Lime Stone Belt
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Scale.
0 1 2 3 4 5 10 Miles.

they can use. The miners who worked the bar previous to its sale to the present owners made good wages, although working at a great disadvantage, having to wheel their gravel to a chute, through which it was carried down to the creek and there sluiced, and then all the tailings had to be shoveled two or three times over to keep them out of the way.

Industrious miners in the district, who own and work ground which borders on the creek, are, almost without exception, doing well. For lack of water, only a small part of the ground within the district known to have gold is being worked. There are large tracts of high ground which prospect well, but are not rich enough to pay for hauling the gravel to the creek. If, however, it should be conveyed to the ground in sufficient quantities for ground sluicing and hydraulic purposes, it would undoubtedly pay well to work such deposits.

Quartz mining for the past few years has received no attention in the district, though there are a number of large veins in the vicinity, upon which as early as 1877 some work was done.

The Grand Island Company have a 10-stamp mill here, which was built to work current ore, but the ore did not carry sufficient gold to pay, and the mill has not been running since 1878.

The Harney Hydraulic Company has been washing during the past season the gravel of bars on the Grizzly Gulch, by the hydraulic process, drawing the water to a sufficient elevation through flumes and ditches. The Deadwood Pioneer reports of this mine that the company has met with as good success as the members of that organization expected. They cleaned up sufficient to defray the enormous expenditures in getting water on their ground and have cash left in their treasury. A shaft was sunk in the main gulch, where the richest prospects have been encountered. As soon as the frost was out of the ground in the spring, a force of 40 men was put at work on the Mitchell Hill. A bed-rock flume was put in and extended 12 feet. The company have the best improved steam-engine and pump; one hydraulic pipe has been in operation for several months with satisfactory results, and two more were set up and nearly ready for work in July. The yield exceeded $300 per day, and sometimes as high as $1,000 per day.

Custer district.—This mining district is situated near the head of Grizzly Gulch and French Creek, of which Custer City forms the center. The bullion production for the year 1882 amounted to $134,000.

The Penobscot mine is located on a fissure vein in the vicinity of the Salmon, and is profitably working a 25-stamp mill. Sufficient ore had been taken out to keep from 5 to 10 stamps running until Christmas. The ore mills a trifle over $5 per ton, and is taken from an open cut reported to be about 70 feet wide. They have reached a depth of 70 feet in their shaft. The production of bullion from this mine during the year 1882 amounted to $30,000.

The Salmon mine, within two miles of Custer City, located on a true fissure vein of free gold ore, is claimed to be one of the richest discovered.

The Grand Junction produced from its 40-stamp mill $15,000, according to one correspondent, and according to another $50,000 worth of bullion during the year. The Custer Chronicle of May, 1882, says of it:

"From a run of 400 tons of ore a retort weighing 75 ounces was made, which at $16 per ounce would make the sum of $1,216. By this it will be seen that the ore averaged a little over $3 per ton, and as the actual cost of mining and milling does not exceed $1 per ton, a profit of $2 per ton is left to the company. The 40 stamps now running will crush 2½ tons to the stamp every 24 hours, and the company are now, or ought to be, clearing about $200 per day, and with the $1 per ton which it costs to mine and mill the ore, which is necessarily circulating in Custer, we can count on the company adding about $20,000 to the Custer Bank roll during the next 6 months, and it is reasonable to suppose that this amount will be increased to $30,000, the $10,000 additional being spent for further improvements."

I have placed its production during the year 1882 at $50,000 gold.

Mr. J. C. McDonald writes concerning the Grand Junction mine, of which he has charge:

"Our ore runs from $2 to $7 per ton; we have run two months on this property since it has been under my direction, and on account of the severe cold weather we have shut down the mill for the winter, expecting to sink some shafts soon, and then to start mill again in the spring. This mine is opened by a tunnel 130 feet in length, crossing the formation to the foot wall, where we struck the ore. The width of the body of ore milled is about 25 feet and the depth gained from the surface is only 30 feet. This is a true fissure vein, with porphyry hanging wall, with every indication that the deeper the ledge goes down the larger the quantity and the better the quality of ore. In connection with this mine is a 40-stamp mill with a capacity of crushing 120 tons of ore every 24 hours. The water supply which comes from Spring Creek is abundant."

The Gold Star has extensive hoisting works and a 20-stamp mill in successful operation. Work on the mine was suspended on the approach of winter, with the intention, as stated, of running in the spring. The ore averages $8 per ton. They are down on the vein 110 feet and are busy sinking this winter. As depth is attained, the character of the ore seems to get better.

The Old Charley and Gold Dust mines produced during the year 1882 bullion amounting to $5,000 and $4,500 respectively.

CHAPTER XIV.

MINES OF THE APPALACHIAN RANGE.

The mines of North and South Carolina and Georgia largely increased their production for 1882 over that of the preceding year. In 1881 the total production was $275,000 in gold and silver, and in 1882 $490,000.

This increase was due to a more systematic working of the mines, and the introduction of larger and more improved plants of machinery. In the vein mines of North Carolina the ores have become so refractory in character that they can no longer be worked profitably by simple crushing and amalgamating processes, and every day demonstrates more and more the fact that concentrating, chloridizing, or smelting works must supersede the methods heretofore employed.

In Georgia, where large bodies of low-grade ores exist, which to a great extent are free milling, the problem of profitable mining is being solved by introducing mills of large capacity, and new methods of mining and transporting the ores.

As in former years, I am indebted to Mr. G. B. Hanna, of the Charlotte Assay Office, for information embraced in the review of the mines. Mr. Hanna visited the principal mining sections of the South and personally examined the condition of the mines.

Messrs. William Treloar and E. B. Hambley, of Gold Hill, F. W. Dygert, of Catawba, William Frecheville, of High Point, J. C. Bates, of Monroe, J. C. Mills, of Brindletown, and John Wilkes, of Charlotte, N. C., and Mr. B. H. Davis, of Auraria, Ga., have also furnished valuable information in relation to the mining industry in their respective sections.

NORTH CAROLINA.

In the eastern portion of the auriferous territory of North Carolina the condition of the mining industry remains unchanged; but little work was done during the year, and in consequence the production of gold was small.

The gold-bearing tract in this section of the State is limited in area and is comprised within portions of Franklin, Warren, and Nash Counties, and the principal mines are the Portis and Tom Arrington, in *Franklin County*, the Kearney and Taylor, in *Warren County*, and the Mann, in *Nash County*. They are all well known, and were described in my last report.

None of these mines are regarded as vein formations, and it is doubtful whether anything deserving the name of a vein can be found or traced in any of them. The gold, which frequently occurs in large nuggets, is found in seams which traverse the country in all directions and in large numbers. The total production from all these mines in 1882 was not over $1,000, but no systematic mining was conducted or even attempted.

Their resources, however, are sufficiently extensive to justify the belief that with careful and economical management and with large hydraulic plants, facilities for which are afforded at most of the mines, they could be made to be paying properties. Until this is done the amount yielded in the few preceding years will not increase and the operations as carried on will be but fitful.

MOORE COUNTY.

This is the extreme southeastern county in the belt of gold territory, and during the year 1882 was the scene of greater mining activity than in the preceding year.

The Bell mine, situated about 10 miles northeast of Carthage, is the property of a Washington company. During the year but little work was done except for development; by August last a depth of 70 feet had been attained and levels driven, aggregating 70 feet in length. The vein matter is quartz in seams, varying from 4 inches to 20 inches in thickness, and so far as exploited appear to be of great persistency, both in length and depth. Other and subordinate seams of quartz frequently occur, but they are not so permanent, although of the same general class of ores. The ore is extremely deceptive in appearance, and on a casual observation would seem to be valueless, but on close examination it is seen to be rich. Assays vary from $33 to $1,300 per ton. Five to ten men are employed, but as it appears to be the policy of the management of the mine, at present, to simply exploit and develop their property, it is doubtful whether any considerable amount of ore will be treated during the current year.

In the northwestern part of the county an interesting group of mines is found in a belt of about 1 mile in width from northwest to southeast, and 6 miles in length from northeast to southwest. The formation in this belt is classed by Professor Kerr, State geologist of North Carolina, as the Huronian, and lies immediately northwest of the Triassic; it may be described as quartzose talcose schist, although there is considerable variation from this type at different localities.

The chief mines of the group are the Brown, Bat Roost, Shield, Cagle, Clegg, Morrell, and Burns and Alfred.

The Brown mine is near the northwest edge of the belt, on the road from Moffatt's mill to Richardson's mill, 1½ miles southwest of the latter. The mine has not been worked during the past year, although it is evident that a large amount of work was done in former years; numerous large pits, stretching along the outcrop for upwards of 300 feet, and large quantities of *débris* point to extended underground work and presumptively to a satisfactory return, but no data are now procurable.

The Bat Roost mine is about 1 mile northeast of the Brown mine, and near Richardson's mill.

The Shields is two miles south and adjacent to the east edge of the belt. It is supplied with a Chilian mill, where small runs of ore are occasionally made. The work done, however, is of an exceedingly desultory character.

The Cagle mine is also near the east line of the belt, and on the east bank of Cabin Creek. It comprises a tract of about 500 acres. It is entered by two inclines, or underlay shafts, the deeper being 160 feet, which gives a vertical depth of 120 feet. The average ore is of low grade, though very abundant, and is composed of quartzose talcose schist, with a small amount of disseminated iron pyrites with a trace of copper pyrites; the ore-body is reported to be from 2 to 9 feet thick and assays vary from $5.33 to $39.88. The milling plant comprises four 5-stamp batteries with the usual appurtenances. During the early part of the year but three men were employed, but the property subsequently changed hands and was more vigorously worked. The production, however, during the year 1882 was but small.

The Clegg mine is adjacent to the Cagle mine and on the opposite side of Cabin Creek. It comprises a tract of 30 acres and is worked by open cuts. The ore-body is a schist, similar to that in the Cagle, but is larger and more decomposed, so that much of the material can be taken out by pick and shovel. It is provided with a 10-stamp mill. During the first half of 1882 the mine was idle, but subsequently was vigorously worked; the result, however, has not been ascertained.

The Morrell mine is but a short distance southwest of the Clegg and contains a valuable body of soft ore, to strike which a tunnel was run through hard ground for about 200 feet, but for some unexplained reason it was abandoned when within 15 feet of where the ore-body is supposed to exist.

The Burns and Alfred mine, in the immediate vicinity of the Morrell (about one-fourth mile to the southwest), is the principal mine of the group and by far the best and most interesting example of this class of mines. It is worked almost exclusively by open cuts and with unusual success, though probably a less amount of ore is mined per day than from either the Cagle or Clegg mine. Ten to twelve men are employed, and the ore is worked by the old North Carolina method of forty years ago, by two Chilian and drag mills, and the management is characterized by simplicity and economy. The latest reports in relation to this mine are to the effect that it has changed owners and passed into the hands of parties in New York. Several other less known and less prospected locations in the same belt are spoken of by those familiar with the ground as deserving attention.

The production of Moore County in 1882 was approximately $15,000.

ANSON COUNTY.

In Anson County no work was done at any of the mines.

The Hamilton, 2 miles southeast of Wadesborough, was in former times the best developed mine and the chief producer, but during the year 1882 it remained idle.

MONTGOMERY COUNTY.

In Montgomery County work was done in 1882 at but five locations, chief among which was the Beaver Dam mine on Beaver Dam Creek, a little above its junction with the Yadkin River. This property contains between 800 and 900 acres, and for a long time has had a high reputation, gained by its richness for surface and hydraulic work. During 1882 the principal operations were confined to sluicing, although Chilian mills were erected to test the value of the quartz from the large number of seams or veins which exist upon the property. Ten men were employed during 1882; the production of gold, however, was but small.

Three miles northeast from the Beaver Dam mine is the Morris Mountain mine, a tract of 350 acres. The ore-body is large, being sometimes 25 feet thick; it is a schist of low grade. Ten men were employed during the summer. No ore was treated, as only prospecting and developing work was attempted. Some prospecting was also done on an ore-body carrying copper about three-fourths of a mile east of the Morris Mountain, but as yet nothing definite can be said of the probable result.

The Coggins mine is located between the Beaver Dam and Morris Mountain mines, and is similar in character to the latter. Only prospecting has been done.

Twelve miles west of Troy, the county seat of Montgomery County, and near the Yadkin River, is the Sam Christian mine, embracing 1,268 acres, and also mineral rights in some adjacent tracts. The gold is found in the gravel of three gulches only, one of which, Moore's Dry Hollow, was worked in 1882. The gravel is washed by the hydraulic method, but there is an insufficient water supply to accomplish effectiive work, a defect that possibly could be remedied. As at present operated 700 gallons of water are raised to a height of 190 feet and then supplied to the pipes. The gold, of which the yield last year was not large, is coarse, usually found as nuggets and rarely in fine grains; 20 to 25 men were employed.

On McLean's Branch, which empties into Beaver Dam Creek, considerable attention was given by the country people to placer mining with reported success. Operations were, however, carried on in a small way only, by rocker-washing.

At the Peebles mine, formerly the Russell, located a mile northeast of the Morris Mountain, a large body of sulphureted ore is available, but it was not worked to any extent during 1882.

The Steele and Sanders mines are about a mile further east. At the former the ore runs in strings, but is exceedingly rich. No work was done at either of these mines.

Montgomery County contains numerous rich alluvial deposits, and as a placer-mining section will doubtless be better known in the future than it has been in the past. The mining done here has been characterized by a lack of energy and intelligent application of well-known mining methods, and what this section of country now requires is capital allied to careful, systematic, and economical management.

The production during 1882 was as nearly as could be a scertained $8,500, but the return should be considerably larger during the current year.

RANDOLPH COUNTY.

In this county the chief mines in operation during 1882 were the Winslow, Hoover Hill, and the Herring, formerly the Lafflin.

The Winslow, or, as it is sometimes called, the Poplar Branch mine, is located about 5 miles southeast of Ashborough, and was in operation during the early part of the year. A shaft has been sunk 95 feet on the underlay of a small quartz streak, which in places has proved to be very rich. A 10-stamp mill was erected on the property, and a trial run made, but for some unknown reason work was suspended, and up to the close of the year had not been resumed.

The Hoover Hill mine comprises a tract of 250 acres. There are old extensive shallow workings dating from before the war, when some rich pockets discovered near the surface are stated to have been worked with considerable success. Since operations were commenced in May, 1881, by the present owners—an English company—a considerable amount of prospecting work has been done amounting to 1,680 feet of drifting and sinking, including a tunnel 600 feet long driven to unwater and open up one portion of the mine. The results so far have not come up to expectations; a few pockets of good ore have been cut, but they were comparatively small. In December, however, a body of ore was encountered in cross-cutting from the tunnel which promises to be of considerable size, and it is hoped that the perseverance displayed in prospecting this property may be rewarded. The mine is equipped with a complete plant, including a 20-stamp mill and power drills. The production of gold during the year was unimportant, as work was confined to development only.

The Herring mine is situated 14 miles southeast of Thomasville. The gold is widely diffused in the soil, which is the soft, loose, decomposed product of a somewhat quartzose talcose and chloritic schist; the surface is auriferous nearly everywhere, but although there is a very large amount of material it is of low grade. It can be cheaply mined and milled. Howland pulverizers are used for crushing, but it is stated that great difficulty is encountered in saving a fair percentage of the assay value of the ore. The mine can be worked to good advantage only when there is an abundance of water at command. The work of 1882 was less than was anticipated, and the return was very moderate. Operations are now suspended.

The Jones mine adjoins the Herring about 2 miles north. A little work was done but no important results were attained. Operations are also suspended at this mine.

The production of Randolph County was approximately $6,000. This amount will probably not be exceeded in 1883.

STANLY COUNTY.

The only mines that were in active work were the Crowell and the Hearne.

The Crowell mine is situated 7 miles eastward from Gold Hill. The greatest depth attained is about 150 feet. A cross-cut 260 feet long was run which exposed four small veins which are reported to be, as are others in the same hill, very rich. The mill is furnished with a 5 stamp battery, a Howland pulverizer, two Varney pans, and a settler, the motive power being a 75 horse-power engine. A large amount of prospecting and surface exploration has been done with comparatively little cost.

The Hearne mine is 2 miles west from Albemarle, the county seat. A shaft has been sunk 100 feet, and the ore is reported to be free milling and of good grade, and the vein of fair width.

The Parker mine, 1 mile from the Crowell, is a placer, worked at intervals by the country people, but on a small scale; the gold is coarse and nuggets are frequently found.

The yield of Stanly County during the year was about $5,000.

UNION COUNTY.

In this county but two mines were worked on a productive scale during 1882, the Bright Light and the Crump.

The Bright Light mine is situated in the northern part of the county, near the county line, and about 16 miles east of Charlotte, in Mecklenburgh County. It was opened in June by the Baltimore and North Carolina Gold Mining Company, and milling was commenced in September and continued uninterruptedly to the close of the year; only the ore from the shaft and levels was milled; the best grade was set aside for future treatment. By the 1st of December the shaft had been sunk 80 feet and levels driven 50 to 60 feet in both directions on the vein. The mill is supplied with three 5-stamp batteries, and the production for the time it was run is reported to be entirely satisfactory. Both the mine and mill are in the best condition to make a large production in 1883.

The Crump mine, near Stout's Station, on the Carolina Central Railway, also made a fair production for the amount of work done, which, although not sufficient to determine the extent of the ore-bodies, yet ascertained that it runs in chutes of high value, so rich that frequently the metal will hold fragments of gangue matter together. The principal work of the year was clearing out an old shaft and drift and sinking a ventilating shaft. In the latter two small pockets were struck, each yielding a little over $500. Work will be continued at this mine during 1883.

Some prospecting work was also done upon the Howie, Smart, Black, Victoria, and several others.

The Howie is in the southwestern part of the county. It is one of the principal mines of the State, and has produced a large amount of gold; it has been in litigation for several years, but the title is now settled. In the latter part of the year about 10 men were employed in surface work.

The Smart, Black, and Victoria are all galena mines, and the ore will probably be shipped to England. It is expected that in the spring of 1883 they will be opened, as also the Penman, and the production of Union County should show a material increase.

The Washington mine is situated about a mile southwest of the Howie, and is under the same management. It was not in operation during the year. Its resuscitation is dependent upon the success achieved with the Howie. The formation is similar in both, and affords large bodies of ore which is always of fair and sometimes of high grade, though usually it is difficult to treat.

The Henley mine, 15 miles east from Charlotte, was worked at intervals by the neighboring farmers; and though the results attained were not large, they profitably remunerated them for the time and labor expended, which otherwise might have been unemployed

Some little work was also done upon the Wyatt and several others with like results.

The yield of the county for 1882 was $3,500.

GUILFORD COUNTY.

In this county the mines are in the granite belt which runs across the State from northeast to southwest. The resources of this mineral section are extensive, but no regular mining work was conducted on anything approaching a large scale.

At the Lindsay mine a little surface work was carried on, but the production was small.

Desultory work was done in other localities with but little success. The total production of the county did not exceed $1,500.

DAVIDSON COUNTY.

This county was the seat of greater mining activity than any other portion of the State.

The Lalor mine, formerly known as the Allen, is situated 2 miles south from Thomasville, and is operated by the Campbell Mining and Reduction Company of New York. The mine is entered by three shafts, the deepest of which is 165 feet on the underlay, equivalent to about 140 feet vertical depth from the surface. The vein is reported to be of great width; the ore carries auriferous iron and copper pyrites. The mill is equipped with a 10-stamp battery and the usual appliances, including also a concentrating apparatus. A roasting furnace on a novel plan has been recently erected to desulphurize the ore preparatory to amalgamation. In November last 78 men were employed.

The Eureka mine is about a half mile west of the Lalor, and has been opened to a depth of 125 feet. The ores are quite similar to those of the Lalor. The mine, however, is lying idle and is filled with water.

The Black mine, adjacent to the Eureka, is the property of the North State Mining Company, incorporated under the laws of Maryland. There are two other companies of the same name operating in North Carolina: one, incorporated under the laws of North Carolina, owns the Copper Knob and Hilton mines; the other, incorporated under the laws of New York, owns property adjacent to Gold Hill, Rowan County.

The Conrad Hill mine is 6 miles east of Lexington. It has 7 veins, only 3 of which were worked. The greatest depth attained is 265 feet vertically, but sinking is going on constantly; 130 men are employed. Four 5-stamp batteries are in operation with the necessary concentrating machinery. The mine is also furnished with a matting furnace of a capacity of 10 tons per day, a roasting shed with a capacity of 100 tons, and 4 reverberatory furnaces. There is also a plant for the chemical treatment of copper ores with 8 solution tanks and precipitation vats. A copper-refining furnace turns out high grades of copper ingots. The management is good in all respects, and is supplied with ample capital. The production in 1882 was the largest of any mine in the State, so far as statistics were collected. Recent discoveries have materially enlarged the resources of the mine, and the milling and reduction plant is to be doubled in capacity.

The Silver Hill mine has been worked to a depth of 650 feet, and is the second deepest mine in the State. The title to this property is in dispute, and nothing has been done upon it for some time, no effort being made even to keep down the water. The north end of the property if properly opened might develop some good bodies of ore, but the old vein is pinching out. It is owned by a Baltimore company.

The Silver Valley mine is about 4 miles northeast of the Silver Hill. It is entered by an underlay shaft of 170 feet, which gives a vertical depth of 110 feet. The mill has 20 stamps and 9 buddles for concentrating purposes, but the treatment of the ore has been very unsatisfactory; it is an argentiferous sulphuret of lead and zinc. A contract has been made recently with parties in Swansea to take the entire output of the mine for several years. Up to December 1,000 tons of ore and concentrates had been shipped. The mine is capable of turning out 3 to 5 tons per day of first-grade ore and concentrates; 50 men are employed.

The Baltimore Gold and Silver Mining Company, one-fourth mile southeast of the Silver Valley, has not passed the stage of prospecting; the ore discovered was so highly sulphureted as to require smelting. It is not likely to add to the product of 1883.

The Cid mine, one mile southeast of the Silver Valley, was down 20 feet in December; very promising copper pyrites is produced, which can be treated only by smelting.

The Welborn mine is 2 miles west of Silver Hill and 3 miles south of Lexington. This property is again being worked, and by November had reached a depth of 60 feet. The ore is galena, carrying copper, silver, and gold; 12 men are employed, and from 6 to 8 tons of ore are raised per diem. It assays high, but a large percentage has been lost in working. It is treated by a process owned by the company.

The Ward mine, 2 miles east of Silver Valley, has reached the depth of 80 feet. On the property there are four veins nearly parallel with each other; there is also a considerable amount of surface suitable for hydraulic treatment. The mine was idle in the latter part of the year, and it is not known when work will be resumed.

The production of Davidson County in 1882 was $20,000.

ROWAN COUNTY.

This county is next south of Davidson, and during the year its mines were actively worked.

Dunn's Mountain mine is 4 miles southeast from Salisbury, and both mining and milling were carried on during the greater part of the year. There are three veins on the property. The workings on the main vein were allowed to fill up with water during the summer as the work was not deemed satisfactory, and the chief operations were confined to the Office vein, which in October was at a vertical depth of 150 feet. A considerable amount of rich ore was obtained from the upper levels of this vein, which with the reserve ore on hand at the beginning of the year permitted a good season of milling. Work is progressing on this vein in a satisfactory manner; levels are being driven in both directions from the shaft on the vein, which is reported to be from 18 inches to 2 feet in width. There are about 600 feet of shafts and tunnels, and 30 hands are employed.

The Reimer mine, 6 miles southeast of Salisbury, has been more extensively worked than any other mine in this vicinity. A large amount of ore of fair grade has been extracted from a chimney several hundred feet in length; the greatest depth attained is 150 feet, and contracts have been made for sinking 150 feet deeper. The vein is from 4 to 8 feet wide, and is highly sulphureted. The mine is the property of the Davis Chlorinating Works, situated about 1½ miles south of Salisbury. At the mine there is a very complete concentrating plant, and the concentrates are sent to the chlorinating works, which employ the Mears process, and are otherwise equipped for thorough operations; 130 men are employed at the mine and 25 at the works. The amount of gold produced at the latter was not large in 1882.

The Bullion mine is 1 mile east of the Reimer and on the same vein. Operations were suspended during the year, but it is reported that the mine is to be pumped out and set to work early in 1883. It is well equipped with machinery, and with good management ought to be made to pay.

The New Discovery mine is located 3 miles east from Salisbury, and was prospected only in the latter part of 1882. No great depth was attained, and operations were suspended for the winter. It is reported that the owner, who is interested in the French Designolle process for treating sulphureted ores, contemplates erecting works for this process at the New Discovery, in which case a market would be provided for refractory ores in Eastern Rowan County as well as from contiguous portions of Stanly, Montgomery, and Davidson Counties.

The Hill mine, 6 miles southeast of Salisbury, has been prospected by parties from that town, and a large amount of fair grade ore exposed. The vein is large and prominent, but the owners are undecided as to what will be done during the coming season.

The Southern Belle mine, 7 miles southeast of the Salisbury, had reached a depth of 160 feet when operations were suspended on account of the air in the mine becoming too foul for work to proceed. Preparations are being made for better ventilation, either by sinking another shaft or providing suitable machinery for supplying air to the present workings. The ore is known as brown ore, mixed with pyrites, and of fair grade.

At the Barringer mine, in the same vicinity, prospecting work was done late in November. It has yielded some extraordinarily rich ore, and if work were actively prosecuted would add considerably to the bullion return of the county.

The Dutch Creek mines, 10 miles east of Salisbury, are on or near Dutch Second Creek. J. J. Newman is the superintendent, and reports twenty-two veins on the property under his management, two of which are copper veins. The chief development is on the Hill, Tip Top, and Katie veins, which afford an admirable brown ore down as far as the water line, and are in width from 1 foot upwards to where the Hill and Tip Top cross, 18 feet. The main shaft is down 70 feet, and in one place 30 feet further by winze. The levels and adits aggregate 1,000 feet; the average run of ore is reported at from $10 to $30 per ton. The workings on the copper veins are respectively 50 feet and 40 feet, and the veins are 3½ to 4 feet wide; the ore is of good grade both in copper and gold. It has heretofore been concentrated, and the concentrates treated by a chlorinating process invented by one of the directors of the company. The result has been quite satisfactory, and a high grade of gold obtained. The company propose to erect an amalgamating plant, and save as much gold as is possible by that method, then concentrate the tailings and treat the sulphurets by any method which will best save the copper.

The Rowan mine is a consolidation of the Bane and Holtshauser, and comprises about 200 acres, adjoining the Dutch Creek mines. There are about forty veins, varying in width from 18 inches to 9 feet; the ore, free-milling brown ore, and sulphurets of iron and copper, chiefly of iron. The work done has been of a prospecting character to ascertain the size and dip of the veins. A shaft is being sunk upon the hill and a tunnel driven from its base to intersect the shaft about 300 feet distant.

The Gold Knob mine is 9 miles east of Salisbury. Only development work was done. There are eleven veins on the property. The mill, a 5-stamp battery, was run to a small extent early in the year. The ores are highly sulphureted, though abundant in quantity.

The Howard mine was also prospected but no results of importance were attained.

The Gold Hill mine is situated 14 miles southeast of Salisbury, and has a history of more than forty years, but of late years has not been in operation. In 1881 it was re-opened by an English company. The property comprises three separate veins, all of which have been opened and worked, the Randolph to a depth of 715 feet, the Barnhardt 350 feet, and the Old Fields to about 100 feet. Operations were commenced at the Barnhardt mine in the spring of 1881, and it received exclusive attention until November last, when operations were temporarily suspended, and work commenced to unwater the Randolph, which is known to have been much the richer of the two, although more expensive to work. This vein has furnished the greater part of the total production of the property, which is estimated by those familiar with the work of the mine at from two to three millions. By the close of the year considerable progress had been made not only in reducing the water but also in retimbering old shafts.

The pump is a 9-inch drawing lift, raising about 150 gallons per minute, and driven by an 80 horse-power engine. There are four plunger lifts in the shaft, two of which have been refitted and put to work. The shafts that are being opened are the Randolph Engine shaft 600 feet, South shaft 400 feet, and Line shaft 400 feet, all on one line.

The veins vary in size and are in a formation of talcose chlorite and argillaceous slate, and they run generally in chutes. The ore extracted of late years was all from the old workings, no sinking having been done; it is the intention of the company now operating the mine to sink deeper and open new levels. In the 400-foot level there is a vein called the Big Sulphur vein, from 3 to 10 feet in width, which was left untouched as in former times it was not deemed to be paying ore, being worth from $5 to $10 in free gold.

Work on the Old Field mine was commenced in November last. A small engine was erected to work a 7-inch drawing lift, and a hoist, and a shaft which has been named the Cochran shaft, was cleaned out and sunk to 130 feet and cross-cut into the old works. Considerable water was encountered, and the trouble experienced from this source was undoubtedly the cause for discontinuing sinking deeper in former times. The old works have been cleaned out, and the veins in the bottom look promising On the surface considerable work has been done. A 20-stamp mill was erected and also a large-sized Blake crusher. The amalgamating works join the mill, and all are run by an 80 horse-power Buckeye engine. A tramway has been built from the mine to the mill, a saw-mill erected, and other improvements necessary to the economical working of the plant.

The stamp mill is supplied with two batteries of 10 stamps, each stamp weighing 750 pounds, and run at a speed of 80 to 90 drops per minute, the height of the drop being about 8 inches. The ore passes through the crusher and is fed to the batteries by hand. The automatic feeds were tried, but after a short time were discontinued. The stamps treat from 1½ to 2 tons of ore per stamp every 24 hours.

Amalgamated copper plates are employed for one battery, which answer well for the free-gold ores, but with heavy sulphureted ores blankets are used exclusively. About 18 feet of blankets, at an inclination of 1½ inches to the foot, are employed. Those at the top are washed every two hours in a large vat, from which when full the concentrates are taken to the amalgamation house and placed in revolving barrels, of which there are four, the charge for each barrel being 13 cubic feet of concentrates, 70 pounds of mercury, and sufficient water to keep the contents in motion. The barrels revolve at the rate of 18 times a minute, and it requires 30 hours for each charge, after which they are emptied into hoppers, and the sand and amalgam are run into a "saxe," which consists of an oblong bed divided into compartments, the first of which, into which the material from the barrels is emptied, is charged with about 225 pounds of mercury. The other compartments are to catch any mercury which might escape from the first compartment. The saxe has a movable cover on top on the under side of which are iron agitators extending into the mercury, and whilst the contents of the barrels is slowly emptied into the first compartment the top of the saxe is given an oscillating motion, which causes the amalgam from the barrels to readily unite with the mercury in the saxe. The sand is washed over into the other compartments and finally passes over blankets, after which the tailings are treated in rockers. The mine and works are under the competent management of Capt. William Treloar, with whom Mr. E. B. Hambley is associated as assayer.

Considerable activity is apparent in the vicinity of the Gold Hill mines, and at no distant day this section promises to become a prominent mining district.

There are many good mines south of Gold Hill and on the same run of lodes.

The Isenhour property if developed would no doubt prove to be remunerative.

The Beaver Hills will also become a good mining district. Gold and more especially copper abound in paying quantities; the formation is one of the best—talcose, argillaceous, and chloritic slates, with ferruginous quartz on the surface.

At the Honeycut surface mine, 3 miles from Gold Hill, large nuggets have been picked up and are yet occasionally found. The whole district appears to be auriferous, from Gold Hill through the Beaver Hills to the Rocky River. There is a considerable amount of brown oxide of iron, with quartz and slate, but carrying iron and copper pyrites in depth. Part of this section, and more especially north of Gold Hill, the formation comprises syenite, and the ores are mostly hydrated peroxide of iron (brown ore, so called), and some contain a high percentage of sulphurets; below the water level they are more or less refractory to treatment.

At the Troutman mine, adjoining Gold Hill, considerable amounts of galena are found associated with zincblende.

The proper treatment of sulphurets is a problem the solving of which would do much towards advancing the mining interests of Rowan County. By the ordinary amalgamation process only free gold can be saved, and while desulphurizing processes are eminently successful in getting rid of the sulphur, they too frequently leave the gold coated with black oxide of iron, which is difficult to remove.

The yield of gold from Rowan County in 1882 was about $24,000.

CABARRUS COUNTY.

In Cabarrus County work was prosecuted during the year at the Phœnix, North Barrier, Tucker, Quaker City, and Rocky River mines.

The Phœnix mine is 10 miles east of Concord, and is worked by the same company that operates the Mears Chlorinating Works near by. Four deep underlay shafts have been sunk on the vein, the deepest being 250 feet, which is equivalent to a vertical distance of 225 feet. A level driven north from this shaft has opened up a body of ore of fair grade 2 to 4 feet wide; the superintendent estimates this unstoped ground to contain sufficient ore to supply the works for from two to three years, working at their full capacity of 10 tons per day. The plant is quite complete, consisting of a 10-stamp battery Walker pulverizer, 3 horizontal rotary roasting furnaces, barrel chlorinators for chlorinating under pressure, leaching and precipitating tanks; 50 men are employed. The company contemplate increasing the capacity of their works. The amount of gold produced and the percentage of the assay value extracted, as reported by the superintendent, showed a satisfactory year's work.

The North Barrier mine is 1 mile south of the Phœnix, and is controlled by the same company. After sinking 50 feet, a volume of water too great to be controlled by the pumps was encountered, and operations were temporarily suspended; no considerable body of ore had been uncovered.

The Tucker mine is 7 miles southeast of Concord, and by the close of the year a depth of 78 feet had been attained; 12 men were employed. The milling plant was run but a few weeks, as the ore proved to be too heavy in sulphurets for that process of reduction, and in November a chlorination plant after Plattner's method was erected and started to test the apparatus; the first run was deemed satisfactory. The chlorination works consist of a single hearth reverberatory furnace, chlorinating and precipitating tanks. It is a model of simplicity and cheapness; the cost being so small places it within the reach of any mine in the section. The amount of gold, as stated by the superintendent as the production of the year, was small.

The Quaker City mine is 1 mile west of the Tucker, and has reached a depth of 80 feet. The ores, however, were found to be so highly sulphureted and refractory to work by the process employed that operations were temporarily suspended until a better method for saving the gold could be introduced. The mill, comprising a 5-stamp battery and a Chilian mill, is situated 3 miles from the mine, on Buffalo Creek.

The Rocky River mine is 10 miles southeast of Concord. It was opened in the fall of 1882. The vein runs across 3 different properties. A shaft was sunk 40 feet, at which depth the vein had increased in width from 4 inches to 18 or 20 inches in width. The ore is unusually rich, but too little work has been done in the mine to determine its value. In December it was sold to Pennsylvania parties. The ore was treated in a Chilian mill, and the runs made in December were good. The reported clean-up from 4½ tons of ore was 20 ounces in gold.

The Reed mine, 10 miles' southeast of Concord, was worked to some slight extent in the early part of the year. This mine has gold in both gravel and vein, and the entire work was given to the latter.

The total production of Carbarrus County during 1882 was $20,000, this amount being for the most part officially stated. The yield during the past year showed considerable increase over that for 1881. And with the new mines being developed and increased facilities for treating the ores the production for 1883 should be still larger.

MECKLENBURGH COUNTY.

In this county, adjoining and south of Cabarrus, nine mines were in operation.

The Hopewell mine, 9 miles northwest of Charlotte, was down about 120 feet at the close of the year, and short levels had been driven to explore the ore-bodies. The ore from this mine carries a considerable percentage of copper. The last work of the year uncovered a large body of free-milling ore, which was believed to be of more than average grade. No arrangements have been made as yet by the company respecting its treatment.

The McGinn mine, 5 miles northwest of Charlotte, has three veins; two of them carry the gold ores usually found in this section, and the third, in addition to gold ores, is rich in copper; the latter is the only one now being worked. The depth reached is 150 feet, at which point a drift was run to meet the ore-body; some ore was found but none was worked. By reason of some unexplained complication the shaft was allowed to fill with water during the last week of the year. Of the two gold veins the principal one was worked to a depth of 50 feet, the machinery not having a capacity for sinking deeper. The ore found was good, but its quantity was not determined by development work. The other gold vein, the Jayne, runs southwestward into the Capps Hill property, where it is intersected by another vein.

The Capps Hill mine, by the close of the year, had been reopened to a little over 150 feet deep. The year was spent in exploration, and over 1,000 tons of ore are now above ground, with a large amount in sight in the mine, all of which is of fair and some of high grade. No machinery is on the ground to treat the ore, nor is it intended at present to erect a plant, but the ore will be turned over to the Designolle Reduction Company, whose works, located 4 miles south of Charlotte, are about ready to commence operations. This mine is one of the most prominent in this section, and has made the largest return of any in the State, except the Gold Hill mine of Rowan County.

The Arlington Guarantee mine is 5 miles west of Charlotte, and has been sunk upon to a depth of 70 feet. Most of the ore was milled during the last three months of 1882, and the amount of development work was insufficient for proper reserves; the amount worked was not large, nor was the grade high. The milling machinery consists of two iron Chilian mills. A tunnel was driven into the hill to tap the vein, both for the purpose of drainage and for extracting ore.

The Clarke mine, 2½ miles west of Charlotte, has been opened to a depth of 70 feet, and some fine ore raised, about 250 tons. No milling machinery is at hand, and the plans of the owner are unknown. The mine has a good record, and though able to add to the bullion product of 1883 it is not likely that it will do so.

The Rudisill mine, 1 mile southwest of the city, reached a depth of 300 feet on the vertical and inclined shafts, equivalent to a vertical depth of 275 feet, and was extensively worked during the year. A large proportion of the ore is too refractory for mill treatment, and is shipped to metallurgical works in the North. The mine is supplied with a 10-stamp mill and amalgamating works, but as the mill was run but a small part of the year the returns were not large.

The Saint Catharine mine is the northeast extension of the Rudisill, and is half way between the latter and Charlotte. It is opened by three shafts, one of 115 feet and the other two 70 feet each. The vein is from 3 to 4 feet wide. A considerable amount of free-milling ore has accumulated on the dump, as no milling of importance had been done during the year, it having been deemed better policy to develop the mine. Thirty men were employed.

The Smith and Palmer mine is 1½ miles south of Charlotte, and in close proximity to the Rudisill. Work was not steadily prosecuted during the year. A shaft has been sunk on the mine to the depth of about 100 feet.

The Baltimore and North Carolina Copper and Gold Mining Company own what was formerly known as the Ray mine. They have five veins of a conjoined length of nearly 4 miles on their property, which consists of 360 acres, situated 9 miles southeast of Charlotte and near the Carolina Central Railway. But three of these veins were worked. The Ray vein is entered by five shafts of varying depths, the deepest being about 120 feet. The south vein is opened 60 feet and the Phiffer Grove vein 40 feet. In the last two veins the ore is the usual brown, free-milling ore, but in the Ray vein it is heavy sulphuret, carrying a large percentage of copper, sufficient to make it a better smelting than milling ore. The mine is well equipped with machinery and milling appliances, and is managed with efficiency and economy. The production during the year was small, as the ore was too refractory for milling.

Mecklenburg County has a large number of mines which have for the most part been idle and some of them even in an abandoned condition for a number of years past. So long as the surface ores were free milling and the gold could be recovered by simply crushing and amalgamating, they were profitable, but when the ores ran into heavy sulphurets they could no longer be worked by the simple appliances at command.

That many of them would prove remunerative by the introduction of processes better calculated for saving the gold cannot be doubted.

The Hunter mine, 1½ miles south of Pioneer Mills, has a 2-foot vein of good ore, which has been opened to 100 feet in depth.

The Crosby mine, 1 mile farther south, also has a 2-foot vein carrying copper and a little gold. It has been opened at intervals for about 300 feet; the deepest workings are 110 feet.

The Rogers mine, 4 miles southwest of the Crosby, has been sunk upon to the depth of 100 feet. The ore is copper and gold.

At the Hanes mine there are several veins on the property; the main vein is from 1 to 6 feet in width, and has been explored to the depth of 120 feet.

The Johnson mine, 8 miles southeast of Charlotte, has been exposed by open cuts 40 feet deep for about 600 feet.

The Stinson mine, 7½ miles southwest of Charlotte, has been worked both as a surface mine and as a vein mine. The placer is reported to be rich and has been but little worked; the ore from the vein at a depth of 25 feet yields from $10 to $30 per ton.

The Maxwell mine, in the vicinity of the Johnson mine, has been opened 70 feet in depth; the vein is from 1 to 6 feet wide, and carries iron pyrites, with a small proportion of copper. The brown ores from this mine yielded $30 to $37 per ton, while the pyrites produced only from $7.50 to $11.25 per ton.

The Bam mine, 1 mile from the Maxwell, has been opened by a 40-foot shaft and by open cuts at intervals for 600 feet; the ore is reported to yield $15 per ton, but has never been extensively worked.

The Tredwick mine has been explored to the depth of 75 feet. The vein is from 1 to 2 feet in width, and the ore is not very highly sulphureted, but carries carbonate and silicate of copper, yielding from $15 to $75 per ton.

The Alexander mine is 5½ miles east of Charlotte. It was worked quite extensively by an English company, who sunk to a depth of 90 feet.

The Farris mine is about 1 mile from the Alexander; is 70 feet deep, showing copper pyrites which yield from $15 to $75 per ton.

The J. P. Henderson mine, 7 miles northeast from Charlotte, has been prospected for 600 linear feet; the ores are brown ore and pyrites, yielding $7.50 to $30 per ton.

The Nolan mine, 4 miles northeast of Charlotte, has a vein 1 to 3 feet wide, which has been opened to a depth of 45 feet; the ores are free milling and pyrites of iron.

The Caldwell mine has been explored to a depth of 90 feet, showing brown ore, which is reported to be of good grade.

The Jordan mine, 10 miles northeast from Charlotte, is opened at intervals on a foot vein for 300 feet, the greatest depth being 30 feet.

The Hipp mine, 6½ miles northeast of Charlotte, has a vein of from 1 to 4 feet in width; the ore is brown oxides and sulphuret of copper. It has been explored to a depth of 100 feet.

The Means mine adjoins the Capps Hill mine, and has three separate veins; the ores are chiefly of copper.

The Henderson mine, 8½ miles from Charlotte, yields $15 to $40 per ton.

The Kerr mine, 10 miles from Charlotte, is rich in copper, and has been opened 80 feet deep.

The J. Alexander mine, 8 miles from Charlotte, is down 40 feet, the ore chiefly brown ore, with some iron pyrites; the vein is from 1 to 3 feet wide.

The Bennett mine is about 1 mile west of the Capps Hill; the vein, at a depth of 30 feet, is reported to be 6 feet wide, and yields from $30 to $40 per ton.

The Todd mine, 5 miles northwest of Charlotte, is 70 feet deep, with a vein varying in width from 1 to 4 feet.

The Frazer mine, 6 miles west of Charlotte, has been purchased by New York parties. The vein is small but of such high grade as to be very valuable.

The Cathey mine is 5 miles southwest of Charlotte. It has been sunk upon to a depth of 75 feet, showing a 2-foot vein of copper, carrying gold.

The G. C. Cathey mine, 8 miles west of Charlotte, is 50 feet down, with a vein from 2 to 6 feet wide of copper pyrites.

The Sloan mine adjoins the G. C. Cathey and carries similar ores. It has been prospected for 300 yards to 30 or 40 feet in depth.

The Steven Wilson mine comprises 340 acres, on which are 10 well-defined veins. This mine has been extensively exploited; there are about 1,500 feet of underground workings; the vein is reported to be from 10 to 30 feet wide, the ores carrying both iron and copper.

The Gibson mine adjoins the Steven Wilson, and has two or three veins from 2 to 4 feet wide; the ore is chiefly of the brown variety.

The Neal, adjoining the Gibson mine, is down 60 feet, with good grade ore yielding in some instances as high as $45 per ton.

McLeary's mine is similar in character and workings to the Neal mine.

The Juggernaut mine yields principally brown ore of an average value of $30 per ton. It has been opened to 60 feet in depth.

McCorkle mine, 8 miles southwest of Charlotte, has been sunk to a depth of 50 feet; the ores are brown oxide and iron pyrites.

The Davidson and Blake mine has been opened at intervals for a half mile, the greatest depth being 80 feet.

The Trotter mine, southwest of the Clark, is down 70 feet, the vein varying from 1 to 6 feet in width; the gold in some instances is in large pieces, and very rich specimens have been taken from the mine.

The Caner mine is 2½ miles southwest of Charlotte; the vein is from 1 to 6 feet wide, and yields from $15 to $90 per ton.

The Charlotte mine has been exploited to a depth of 175 feet, with a fair-sized vein of average quality.

The Sam Taylor mine, 3 miles west from Charlotte, has been prospected to a depth of 30 feet; the ore yields from $15 to $45 per ton.

The yield of Mecklenburg County in 1882 was approximately $13,500.

GASTON COUNTY.

In this county the principal mine is the Kings Mountain. The mine has been opened to a depth of 332 feet. The veins, commonly known as the front and back veins, are of great thickness, sometimes as much as 40 feet. The front vein has always been considered to be the richer of the two. They are in limestone formation. The mine has been closed for nearly two years, and is now full of water; nothing will be done with it until the several matters in litigation are disposed of, which probably will not be until the summer of 1883.

During 1882 some small outlying bodies of ore and also tailings were worked with considerable profit. The mine has a 40-stamp mill, but in

November two batteries were removed to a more convenient place for the treatment of a body of low-grade ore which had been exploited. If operations are resumed in the mine in 1883 the yield is likely to be of importance.

The production of Gaston County during the year was $7,500.

LINCOLN COUNTY.

In Lincoln County the Hoke mine, situated 4 miles from Lincolnton, was the only mine at which any work was done during the year. It was opened to a depth of 110 feet, and the vein, which is reported to be of good width, was drifted upon for some distance. The mine is not provided with a plant of machinery for reducing the ore, and the future intention of the owners is not known.

CATAWBA COUNTY.

The Shuford mine is situated 5 miles from Catawba Station, and the property comprises 425 acres. It is a surface mine, and the soil for many acres is rich with gold; a large amount of float quartz is on the surface, which is suitable for milling purposes. The mine was formerly worked for its pockets and stringers. There are two prospect shafts down 65 and 70 feet, respectively. The ore is a quartz, carrying free gold; the vein averages 3 feet wide in the 65-foot shaft, in which a level is at present being driven. The machinery plant consists of a Knowles pump of 50 horse-power, with a 75 horse-power boiler of Babcox & Willcox manufacture, and a Frazer & Chalmers 5-stamp mill, which has lately been completed and put into operation. The pump is capable of moving 10 cubic yards per hour. The pay streak is about 150 feet wide, as deep as the present washing, 20 feet, and is composed of stringers of quartz in slate, which after washing make fair milling ore. The material in the pay streak averages 19 cents per cubic yard by washing. The pump was used but four months in the year, prospecting or uncovering the ledge, which composes part of the hill. The prosperity of this mine depends almost exclusively upon the supply of water. If this has been provided as completely as it is thought to be, the mine should have a successful run in 1883. The mine is the property of W. A. Sweet, of Syracuse, N. Y., and is operated under the efficient management of Mr. F. W. Dygert.

There are several other placer locations in Catawba County which have been operated in a desultory way for want of capital to supply sufficient water for hydraulic purposes.

The yield of the county for 1882 was $2,500.

M'DOWELL COUNTY.

Eleven miles south of Marion the Vein Mountain Mining Company are at work. This is operated as a placer mine, although a large number of veins intersect the property. Water is brought from the upper reaches of the Second Broad River by a ditch, which with its branches aggregates about 11 miles in length.

The gulches about the mountain, though they have been worked for 40 years, still yield their rich contents. To the present time only hydraulic work has been done, but not to the extent which this important locality deserves.

The last year was spent chiefly in prospecting the quartz veins, twenty-two of which were uncovered; some of the veins can furnish an abundance of good material for a mill of large size. The property embraces upwards of 6,000 acres; the north or Huntsville end has been less prospected, but is known to abound in rich gravel. The water supply is deficient and the topography of the adjacent country is unfavorable for remedying this defect, and precludes any extensive mining of this part of the property for the present. Twenty-five men were employed, but the production was not large.

The Hard Bargain mine is located a half mile west of Vein Mountain, and was operated by Messrs. Smart and Wright with fair results. Their work was confined exclusively to sluicing.

The individual operations to the southeast of Brackettown were not so generally pursued as in former years.

The storekeepers from Brights to Dysartville, to whom the gold thus mined is sold, state that about 100 persons work on their own account with more or less constancy.

The Granville mine is 2 miles east of Vein Mountain, but it was idle during the year.

BURKE COUNTY.

At Brindletown, 16 miles southwest of Morganton, are the mines of J. C. Mills. The water supply was enlarged in 1881, so as to allow an extension of the work in 1882. The ditches aggregate nearly 15 miles, and the property embraces 2,800 acres. The yield was reported for 1882 as being an increase over that for the preceding year, and the prospect is good for a further increase during the current year.

The Hancock mine, 14 miles southwest of Morganton, is operated by a Boston company. The property consists of 500 acres, of which 250 acres are mineral lands. The water supply drawn from the place is too small for efficient work. Negotiations were in progress, and nearly completed for the purchase of other tracts of land adjacent to this mine. The production for the year was not large, but very fair for a new enterprise.

The Glen Alpine and Little Queen mines are 1 mile east of the Hancock, and near the Glen Alpine hotel.. Only preparatory work was done during the year.

The Carolina Queen mine is situated 2 miles southeast of the Hancock. It contains 750 acres, and was in full and prosperous work. The water is brought by a ditch 4 miles in length, and is sufficient for present requirements. Gravel washing received the chief attention, but several veins had been encountered, and five partly developed, which are likely to add considerably to the returns. The mine is the property of a Boston company, which declared four dividends since June, 1882.

RUTHERFORD COUNTY.

In Golden Valley, across the South Mountains, and from 4 to 6 miles from Dysartville, two mines were at work: the Connecticut Mining Association of Hartford, and the Greyson mine, worked by the Meriden Company.

The former own what was formerly known as the Lawson Smart tract, embracing 500 acres, of which one-half contains mineral. Work was confined chiefly to the construction of a ditch to furnish water for hydraulic purposes. The property contains also a number of veins, sixteen of which are known. The miners of the neighborhood have a high opinion of the resources of this mine.

The Greyson mine is 2 miles farther south. Although there is a considerable amount of gravel on this property, the mine was worked for its ore supply. The mill is a 5-stamp battery, with a Halliday pan. Much work has been done in Golden Valley for two generations, and there are still a number of localities well adapted for improved hydraulic operations, and arrangements are being perfected for opening other mines in this vicinity.

The gravel area of the upper Laurentian in Burke, McDowell, Rutherford, and Cleveland Counties, where they come together, is 15 to 20 miles long from northeast to southwest, and 10 to 15 miles wide from northwest to southeast.

The Polk County deposit, some 25 miles southwest, may be an extension of this area. Almost everywhere in these limits gold is found, although not always in paying quantities. As more efficient and economical processes are introduced the paying areas will be enlarged and become more numerous.

The gold hitherto extracted has been almost exclusively from the gravel, but its source must be looked for in the rich seams of quartz which everywhere and in great numbers traverse the schists of this section, sometimes conforming to the schists and at other times differing from them in course or in dip or in both.

The production of McDowell, Burke, and Rutherford Counties during 1882 was $37,500.

POLK COUNTY.

There are several well-known localities in Polk County where gold might be obtained in paying quantities if a good water supply could be secured. Mining was in progress during the year in a number of localities, but it was of rather a desultory character, with the exception of work at the Prince, Double Branch, Splann, Hamilton, and Rideing, but the result was not large.

The production of the county was no greater than in 1881, and may be placed at $3,500.

CALDWELL COUNTY.

The Baker mine is 12 miles north of Morganton. It carries considerable galena, which will most likely require smelting. The mine formerly had a good reputation.

Of the production of the transmontane region nothing has been learned except that it was small, and inquiry failed to elicit anything definite. Gold from Cherokee County is occasionally deposited at the United States assay office at Charlotte, and this shows that some work is done.

That section of country is quite as much connected commercially with Georgia as with North Carolina, and it is probable that a portion of the gold produced there is carried to Georgia and credited to that State, but the amount cannot be large. The product is not likely to have been over $2,000.

The following is a summary of the production of North Carolina by counties:

	Value.
Nash, Warren, and Franklin	$1,000
Moore	15,000
Montgomery	8,500
Randolph	6,000
Stanly	5,000
Union	3,500

	Value.
Guilford	$1,500
Davidson	20,000
Rowan	24,000
Cabarrus	20,000
Mecklenburg	13,500
Gaston	7,500
Catawba	2,500
McDowell, Burke, and Rutherford	37,500
Polk	3,500
Cherokee	2,000
Total	171,000

The above amount is compiled, with trifling exceptions, from official reports. It is stated as a gold production, but contains silver as a native alloy to the extent perhaps of $2,000.

A considerable part of the bullion produced was by English companies, who shipped it direct to London; $83,096 were deposited at the United States mints and assay offices. In addition to the amount of bullion produced at the mines there were shipped from the State 1,000 tons of argentiferous galena and nearly 200 tons of auriferous sulphurets. The value of the former was about $25,000 and of the latter $17,500. These amounts bring the total production of the State to $213,500.

The number of stamps employed in the State in 1882 was 335, and 40 additional have been contracted for.

The metallurgical works connected with the Conrad Hill, Reimer, Phœnix, Tucker, and Gold Hill mines, have been described in this or in previous reports, and most of them continued to do good work. The two reduction works at Charlotte still remain idle, and it is not known whether they will again be put into operation.

The Designolle works, 4 miles south of Charlotte, were not completed by the close of the year, but as they were being vigorously pushed they will doubtless soon be in operation. The establishment is finely equipped with necessary facilities for the treatment of ores.

SOUTH CAROLINA.

Mining operations in this State during 1882 differed but little in character and result from those of the preceding year. The water supply was more abundant.

In *Spartanburg County* no regular or systematic work was done; a little gold was washed out by individuals, but operations were conducted in a more desultory manner even than in 1881.

The Hammett placer mine, on Pacolet River, was prospected in the summer of 1882, but no permanent results were attained.

In *Greenville County*, near the Spartanburg line, the McBee mine was opened to some slight extent, but the yield was small.

In *Union County* the Chase-Thompson mine was in operation through the summer, a 10-stamp battery being employed; trouble arose however among the parties interested in the mine, which caused a suspension of operations. The reported product of the mines of Union County for 1882 was $12,500.

In *Abbeville County* the Dora mine remains as in former years, and the work done here as well as at the other mines of the county was small; no estimate of yield of the county places it at over $2,500.

In *York County*, the Magnolia mine is situated at Hickory Grove; some work was done on the Girty vein, which is down 100 feet. The vein is 5 feet in width, and the ore is heavily charged with sulphurets. The mill is supplied with a 30-stamp battery.

In *Lancaster County* the Haile Gold Mining Company, the largest operator in the State, prosecuted work upon their mines with vigor during the greater part of the year.

The superintendent, Mr. E. Gybbon Spilsbury, reported to this bureau as follows:

During the latter part of 1881 the company stopped several outlying works on their property, and concentrated their whole energies on the development of their main mine near the southeastern portion of the estate. This was commenced by sinking what is known as No. 3 shaft, which during the past year has been put down to a depth of 125 feet; at this depth a level was driven to undercut the old workings, and at a distance of 130 feet east of the shaft the deposit was cut through, showing a width of nearly 50 feet and an average assay value of $10 per ton.

Owing to difficulties in controlling the influx of water little ore was extracted at that level, but preparations are being made to push the work with much vigor. In order to keep the mill supplied with ore and also to further develop the vein, a large area of ground was uncovered to the east of No. 8 shaft and an incline sunk in that direction to a depth of 60 feet. At that point an enormous vein was uncovered averaging 45 feet in width, composed of a very hard indurated, talcose slate, in some places almost resembling quartzite underlying the lamellar talcose slates of the country. This indurated talc carries gold, both free and combined with iron sulphides, its average value being from $11 to $18 per ton. Underlying this again is another bed about 15 feet thick composed of a similar rock, but much more impregnated with ferric and arsenical sulphides up to the extent of 40 per cent., and having an average value of $30 per ton. This vein has now been traced over 2,000 feet on the surface, and its discovery will very shortly render this mine one of the largest producers in the country.

During the year two other nearly parallel veins of almost equal extent were developed.

Previous to the 1st of May no work except construction and development was done on the property. Two new batteries of 5 stamps each were added to the mill, making a present total of 20 stamps. A new and complete amalgamation works having a daily capacity of 20 tons was also built to treat the roasted sulphides.

In 1881 the company constructed an experimental roasting furnace under the patent of Mr. T. G. Walker. After running it through the early part of 1882 they were so well pleased with the perfection of the roasting attained that late in the fall they decided to build a second much larger and more complete than the first one. This furnace is now about completed and will be one of the most perfect plants of the kind in the country. It has a capacity of 10 tons of highly concentrated sulphurets per day. Notwithstanding the fact that the whole year of 1882 was devoted exclusively to development, still the average monthly yield of gold may be placed at $1,800. The last few months of the year exceeded this, and in the month of January, 1883, the yield in the stamp mill alone will exceed $3,000. With the new furnace running on concentrated sulphurets, which assay from $75 to $500 per ton, a yield may reasonably be expected of from $12,000 to $15,000 per month.

One peculiar feature of the bullion from the lower levels of the mine is, that it carries much more silver than that from the surface, amounting to almost 10 per cent. in weight of the bullion. The surface and gravel gold contains scarcely a trace of silver.

The company propose shortly to bring in sufficient water to hydraulic the immense beds of gravel and alluvium on most of the hillsides on the property, all of which run high in gold. During the past year a close test made on several hundred tins from the large deposit of tailings (amounting to over 35,000 tons) thoroughly demonstrated that they contain an average of over $5 per ton. A prominent position may therefore be predicted for South Carolina in the next few years among the gold-producing States of the Union.

The Gay mine, 3 miles south of the Haile, is a new mine that has recently been purchased by northern parties who contemplate a vigorous development.

At the Funderburke mine, 12 miles northeast of the Haile, some work was done in the early part of the year. It has recently been closed.

In *Chesterfield County*, at the Brewer, the work of the year was chiefly developmental. The yield was not quite so large as had been anticipated, as work was somewhat slackened during the summer pending some negotiations. A portion of the force was also taken from the regular work to open another part of this extensive deposit. The character of the gravel remains unchanged and the system of work is in full vigor. The part of the mine recently opened by the managers affords an immense mass of comparatively rich material from which the finest results are expected. The mine is in good shape for a larger production in the immediate future than has been made for several years past.

The production of South Carolina in 1882 is estimated by Professor Hanna to have been from $20,000 to $25,000.

GEORGIA.

The year 1882 witnessed a marked increase in the mining industry in Georgia. Not only was there an increase in the yield of gold, but the productive area of the State was enlarged to some extent chiefly by an extension in the southwestern part of the main belt, and to a lesser degree of sections not included in the belt.

The increased production was most noticeable in the neighborhood of Dahlonega and Auraria, in Lumpkin County, and was due to several causes. Not only were a larger number of mines at work, but the mines generally were in a better condition of development with larger and more accessible ore reserves, and operations were conducted with much greater efficiency and economy in nearly every department of mine management.

In no other mining section of the auriferous territory of the Southern States is there so large or so widely diffused an amount of low-grade ore, much of it so low indeed that in many mining regions it would scarcely be considered to add to the mineral resources, and yet in Georgia each season shows some marked advance toward a perfect solution of the problem of treating an immense amount of low-grade, and in some instances barren schists, in order to reach the auriferous quartz seams and veins beneath; these veins also are frequently of low-grade ore and require costly mill treatment to obtain the gold contained. Experience has taught the best methods of treatment and the most suitable machinery to be employed, and this, added to the superior natural advantages possessed by the northeastern portion of the gold belt, has permitted the working of material which heretofore has been considered of too poor a quality to yield a fair return for the labor and capital expended in its treatment.

Georgia has been unusually favored also in numbering among her mining population a few men combining in a rare degree business tact, mechanical skill and executive ability. Dahlonega and Auraria districts have been the first to experience the benefits of their work, but their influence has been noticed also in other sections, and a greater degree of efficiency is observable in mining superintendents throughout the whole of the gold-producing area of the State.

RABUN COUNTY.

In this county, which is in the extreme northeastern part of the State, the principal mine is the Smith. This mine comprises two tracts, each of 490 acres, and is the only mine in the county where any notable amount of work was done in 1882. During the spring and summer the work was chiefly for development; the open cuts were enlarged and deepened in order that a large supply of ore, sufficient for the steady operation of the mill, could be obtained, and while the mill was in course of erection work was prosecuted also in bringing water from a remote party of the property. A number of veins and seams of quartz with the usual auriferous slates accompanying them have been developed, and the ore, both in amount and richness, fully justified the expectations of the owners. The surface is so extremely diversified as to expose several places admirably adapted for exploitation, and work is being done at another point a half mile from the main workings, the indications being equally as favorable for quantity and quality of ore. The 10-stamp mill was completed in the autumn of 1882, and a few experimental runs were made to test the efficiency of the machinery, with reported good results. The mine is now in condition to perform steady work, and should make a substantial addition to the bullion production of the State.

The other mines of the county are the La Præd, Young, W. V. York, Moore, and Howard, at which some little prospecting was done during the year.

HABERSHAM COUNTY.

A little work was done in this county in sluice mining, but the gravel deposits are not sufficiently extensive in area nor rich in gold to permit large returns. Small parcels of gold are bought to a considerable extent by traders, both in Habersham and Rabun Counties, showing that numerous localities are worked at intervals with probably very limited returns. The gold finds its way through Mount Airy and Clarksville, though much of it is purchased and sent to Dahlonega or Atlanta.

The production of the two counties in 1882 did not differ materially from that in 1881, and according to the most trustworthy information amounted to about $10,000.

WHITE COUNTY.

That portion of the belt between Rabun County and Nacoochee Valley, in White County, was worked, as in 1881, by small parties, and chiefly in surface and hydraulic work.

The reports received indicate that operations were conducted in a greater number of localities, and with an increased yield.

In Nacoochee Valley but little change in the mining industry is seen. At the mine of J. R. Dean, on the Chattahooche slope of Hanby Mountain, the work was of the same character as in 1881.

The Nacoochee Company are reported to have had an increased production. The territory controlled by the company is quite large, and some excellent property has been leased and added to their resources.

The Bradley mill remained idle during the year, but hydraulic work on the property was more active.

On the Lumsden mine less work was done than in former years. Johns & Co., at the junction of Dukes Creek and the Chattahooche river, did only a small amount of work.

E. R. Trimble continued operations on the Thompson mine without any material change from the production in 1881.

The Louds Ditch and Mining Company, whose property is southwest of Nacoochee, and near the west border of White County, were more actively at work than for some years past, and the yield of the year is reported to have been quite satisfactory. Considerable coarse gold and nuggets are found in this mine; the largest piece during the year weighed about 2½ ounces, though in former years much larger have been found, the heaviest weighing 9½ ounces.

Small operations throughout the county are more numerous than in any other county of Georgia, and have added not a little to the bullion product of the State.

The most accurate information attainable respecting the yield of White County in 1882, indicates about $25,000.

LUMPKIN COUNTY.

The work of the year in Lumpkin County was of the most favorable character. At the close of 1871 there were fifteen mines with 270 stamps in operation, and at the close of 1882 there were seventeen mines and 360 stamps; 90 additional stamps had also been contracted for and are likely to be at work before the summer of 1883.

The water supply was fairly adequate to the necessities of the mines until near the close of the year, when it failed somewhat, owing to the unusual dry weather, and the mills were compelled to suspend operations at night or else use only a portion of their batteries.

The Columbia mine is 2 miles south of Dahlonega. It, with its 20-stamp mill, was idle a considerable part of the year. Its ore-body proved to be unsatisfactory, and the prospects of the mine were not regarded as favorable. Near the close of the year it was reported that some good mining property had been secured adjacent to the Bast mine which would place the mine in condition to make good returns as soon as some necessary preliminary work could be performed. The returns for 1882 were small, and it is not probable that operations on the newly acquired property can be advanced sufficiently early in 1883 to permit a large production for that year.

The Consolidated Georgia Mining Company own the Bast and Ivey mines. The Bast is 1 mile southeast of Dahlonega, and is located on what is known as the Findley belt. It is worked by open cut, and is supplied with water for sluicing from the Hand ditch, the water being raised to the top of the cut by pumps.

At the close of the year the cut was in much better shape than it had been at any previous time, the ore supply was larger and of better character. The mine is supplied with a 20-stamp mill, which was run continuously day and night, stopping only for necessary repairs.

The Ivey mine is situated on the Pigeon Roost belt, about a mile southwest of Dahlonega, and is one of the most important and interesting mines in the district. It is worked by open cut, and the formation is a soft talcose slate, full of quartz veins of various sizes. Most of the slate dissolves before the Little Giant hydraulic, and the ore set free is carried to the mill through sluice-boxes and delivered in the ore-bin behind the batteries. During 1882 the supply of ore was greater than in the preceding year, and of better grade. The mill is equipped with 20 stamps, but they have been found inadequate to crush the ore as rapidly as it can be supplied. The company have laid the foundation for a 60-stamp battery a quarter mile from the present mill, to which the 20 stamps now in use will be moved. The new mill will be at a level 70 feet lower than the present site and allow the exploitation of a large body of valuable ore not now available. It will be run by water-power taken from a new ditch which is nearly finished. This ditch is of large dimensions and 12 miles in length, and takes its water from the head of Cane Creek. The mine will have an ample supply for hydraulic purposes and be entirely independent of other corporations in all its operations.

The affairs of this company are in the most favorable condition, the production is large, and the mine expenses small and readily calculable. It has recently declared its twentieth monthly dividend of 4 cents per share, amounting to $4,000.

The Findley mine is about 1½ miles southeast of Dahlonega. The condition of this mine for furnishing ore was no more favorable than in 1881, and but a portion of its batteries could be kept in operation. Neither the quantity nor quality of the ore had improved. A large portion is quite compact and more refractory than the usual run of Georgia ores, necessitating therefore a greater expense in its treatment. The water used in this mine is taken from the Hand ditch and pumped to the top of the hill, and this adds materially to the expense of mining.

Two mills are run in connection with the mine; one of 30 stamps, run by water power on Yahoola River, and a 20-stamp steam mill situated near the head of the cut. The yield for 1882 was reported as less than that for 1881.

The Singleton Company's property comprises six 40-acre lots, situated a mile east of Dahlonega—the Singleton, Gowdy, Collins, Hamilton, and Lockhart.

The Lockhart is located on the Findley belt, and is one of the earliest-worked mines in this section. The shaft sunk in 1881 to cut the ore-body was carried down to a depth of 51 feet, but as it was only a short distance from the Yahoola River it was found to be difficult to keep it free from water. From the bottom of the shaft a level was run southwest for a distance of 75 feet. The vein is from 6 feet to 14 feet wide, and the ore is of higher grade than that from other mines on the same belt. A tunnel was also driven into the hill for a distance of 150 feet, and is in ore. The mine is supplied with two mills; one of 5 stamps run by water; and a 10-stamp steam mill erected during the year. The company has contracted for 10 stamps additional, and the entire 25 will be run by water-power from the Yahoola River. Milling was carried on only part of the year, and the yield was moderate.

At the Singleton mine the ore-body was not entirely satisfactory, and but little work was done in milling ore at the 10-stamp mill with which the mine is equipped. The chief work was in prospecting and developing. A tunnel was pushed through the hill into the Gowdy lot, and with very favorable results. The condition of the workings in the mines of this company and the amount of ore of fair grade at command render it probable that there will be a larger production in 1883.

The Fish Trap mine is 1¼ miles southwest of Dahlonega. In this mine the slate is micaceous and soft and can be mined at but little cost by the use of hydraulics; the quartz veins through the slate are small, but of very high grade. There is a sufficient supply of ore to keep the mill constantly employed. The mill is of 20 stamps, run by steam power, and is situated about half a mile from the mine; 10 stamps were added to the mill in August, 1882. It was in operation only about half of the year. The mine is economically and skillfully managed. The Dahlonega Signal reports the production for December at $1,500.

The Barlow and Hand mine is situated about 3 miles southwest of Dahlonega. It comprises a number of 40-acre lots on the west side of Cane Creek.

This mine continues to maintain its reputation as a model of a well-conducted mining enterprise, and yet in former times the management was conspicuous for its failures. In 1866 a large and expensive 40-stamp mill was built, and the mine was worked without the aid of water, by what is termed "dry mining." Excessive rates were paid for labor, and in many respects little judgment was exercised, and in consequence operations closed and the mine remained idle for several years.

Under the present management and by the use of the most improved methods of economical mining, it affords one of the best opportunities for investigating the peculiar conditions of intelligent and successful mining in Georgia. At the close of the year the cuts showed an amount of ore and of a quality fully equal to the supply for several years past. The water supply was greater than in 1881, and the amount of work accomplished was correspondingly increased. In December, from 150 to 200 inches of water were used which was supplied by the company's ditch, and 150 tons of ore per day could readily be run through the mill the length of sluice (more than 2,000 feet), with a full grade greatly facilitating the crushing of the ore.

Formerly it was the custom of mill-owners to select a mill site as near to the mine as the conformation of the ground would admit, and they were slow to recognize the advantage derived from a long sluice in which the ore would be disintegrated and broken up to a great extent before it was delivered at the mill, thus increasing the capacity of the latter. In this respect the Barlow and Hand mine is, with one exception, the best favored by the nature of the ground of any mine in this section of the State.

The mill, which is supplied with eight 5-stamp batteries of the Hall pattern, is well arranged for good and cheap work. The batteries have done good service and begin to show the effects of wear, otherwise everything is in good condition. The ore sheds are large and the conveniences for transferring ore to the mill are adequate and economical. The force employed is 19 men by day and 5 to 12 at night.

The Pigeon Roost mine is situated on the Pigeon Roost belt, adjoining the Barlow and Hand. The mill is equipped with 10 stamps, and is quite similar in most respects to other mills of this section. The company contemplate adding 20 stamps in 1883.

The cut is about 250 yards from the mill, and the grade is weak. Water is taken from the property of the company, and the supply is not sufficient for efficient work; no piping is done. Operations were carried on but a short time to ascertain the character of the ore supply. It is the opinion of practical miners in the neighborhood that the mine promises well in the near future.

The Calhoun mine embraces lots 164 and 168 in the eleventh district. It is on the east side of the Chestatee River, across which the company have constructed a bridge for their use and convenience. They have also built a dam across the river and thus utilize the ample water supply in running their mill and pumping water for hydraulic purposes.

In former times this mine was the property of John C. Calhoun, and was noted for the richness of its surface deposits, although but little had been done to develop its resources. In this mine the larger number of quartz seams exposed run contrary to the schists, and in this respect it differs from the formation usually found in this section. The ore-body is situated upon a hill 290 feet above the Chestatee River, and is entirely too high to be commanded by the water from any of the ditches in this vicinity. The company therefore have constructed a reservoir on the hill, which is supplied with water from the river by means of a large pump driven by a powerful turbine wheel. From this reservoir the water is drawn for hydraulic work in the cuts.

The ore is taken from the cuts to the mill by a sluice of 2,700 feet in length, which has a sufficient grade to materially aid in preparing the ore for the batteries. The mill of 40 stamps is one of the finest in this section of the State, and is a perfect specimen of mechanical skill and thorough workmanship; its operations are similar to those of other establishments, differing only in a few details, which make it a little more efficient; all the improvements which long experience and observation have afforded the constructing engineer, Mr. F. W. Hall, are embodied in this plant.

The Keystone mine comprises lots 868, 869, 884, 885, 886, 936, 937, 940, 941, and a part of 887, situated on the west side of the Chestatee River opposite the Calhoun mine. It was formerly worked by a Philadelphia company, but is now the property of the Goldsmith Mining Company of New York.

At least 80 or 100 acres of the property in the bend of the Chestatee, and between that river and Cane Creek, is fine gravel, which a recent examination shows to be worth from 50 cents to $1 per square yard of bed-rock. The surface of a large part of the tract is very diversified, and wherever water could be brought informer times the amount of working that had been performed indicated beds of great value; many of the gulches will pay handsomely under extensive hydraulic treatment. At the close of the year the water supply was small and permitted only sluicing; nevertheless the results were reported to be good.

A full supply of water for piping and other hydraulic work will soon be secured. A flume of sufficient capacity to furnish water for a 40-stamp mill was under way and nearly completed in December. The company contemplate erecting a mill shortly, but have not fully determined upon the pattern.

The quartz veins upon the property are sufficiently numerous to keep a large-sized plant in continual work. Several months must necessarily elapse before any considerable return can be expected, but if the contemplated work be pushed with energy and judgment the mine should take a high rank as a producer of bullion before the close of 1883.

A few small properties in the vicinity of Dahlonega were prospected with reference to commencing operations; among them may be mentioned the Teal, McAffee, Buffington, Lamar, and Logan, but upon none of them except the Logan was any work of importance done.

The mines at work in the immediate vicinity of Dahlonega, with the number of stamps in operation, are given below; for the purpose of comparison the number of stamps running in 1881 are also stated, as well as the stamps contracted for in 1883:

Mines.	Stamps in operation.		Stamps contracted for.
	In 1881.	In 1882.	
Columbia	20	20	....
Calhoun	......	40	....
Barlow and Hand	40	40	....
Pigeon Roost	10	10	....
Consolidated Georgia, Ivey	20	20	40
Consolidated Georgia, Bast	20	20	....
Fish Trap	10	20	....
Findley	50	50	....
Singleton Company, Singleton	10	10	....
Singleton Company, Lockhart	15	15	10
Total	195	245	50

Small and individual operations, such as characterize the mining industry in White County, are infrequently undertaken in Lumpkin County. Parties whose opportunities for obtaining information are good estimate the amount so produced variously from $5,000 to $15,000 per annum. The gold obtained is bought chiefly by traders and remitted to Atlanta to purchase goods. It is the opinion that individual work does not produce over $10,000. The total production of Dahlonega district in 1882 was ascertained to be about $185,000.

Six miles southwest of Dahlonega, and in Lumpkin County, is Auraria, which is the center of another mining district. Some of the mines noticed in connection with Dahlonega district are situated quite as near to Auraria as to the former place.

The Chicago and Georgia mine, situated on the Pigeon Roost belt, is about one-fourth mile northeast of Auraria. The work during the year was steady, and the production though not large maintained the old reputation of the mine; the work was simplified in the direction of greater economy. The mill of 10 stamps ran regularly for ten months of the year under the management of J. P. Imboden, but as the lease expired in December, operations were suspended. With ten more stamps this mine would pay a good per cent. on the cost of the plant.

The Auraria mine is situated on the Pigeon Roost belt, half a mile west of Auraria. The mine has been at work a little over a year, but did not reach the veins properly until about the middle of the year. Since opening the new ground the owners have done well; the material is quite as rich as that found elsewhere on the same belt, but the supply is not quite so large nor so favorably situated. For a considerable part of the year the water supply was so weak and irregular as to impede the work of sluicing and piping. The mill has 15 stamps, and is located on the Etowah River, which furnishes a very fine water-power.

The Danæ mine is situated on what is known as the Thomas belt, about a quarter mile southwest of the Auraria. A portion of the mine is included in the Pigeon Roost belt, and also in the Big White belt. It is equipped with a 10-stamp mill, and draws its water from the ditch of the Dahlonega Mining Company. Work was done during the last half of the year, and only experimental runs of the mill had been made up to the close of the year. The results were not flattering, and the ore-bodies are not in a shape to allow of productive work, at least not until considerable preliminary work shall have been accomplished.

The Wells mine is located about a fourth of a mile south of Auraria, on the Black belt, and is now idle awaiting the construction of a reduction works either at the mine or at Gainsville. The vein is from 16 to 24 inches wide, and opened by an adit about 500 feet on the trend of the vein and 40 feet down. The ore is too highly sulphureted for mill treatment, and yields only about $5 per ton by the ordinary stamping process. By assay it gives from $16 to $94 per ton, the average of twelve assays being $37.50 per ton. The mill of 10 stamps was formerly on the Hightower property, from which it was moved in 1881. It ran part of the year on ores from Whim Hill.

The Cleveland or Baggs Branch mine is on the Findley belt, 1¾ miles south of Auraria. It is equipped with 10 stamps, of which 5 are run by water-power. The mill is also supplied with an engine, by which the whole number of stamps are at times operated. The cut is in good shape for continuous work, and the mine will probably keep up a steady production.

The Hightower mine is situated on the same belt as the Cleveland, and three-fourths of a mile southwest on the Etowah River. The mill, formerly of 20 stamps, but now of 10 stamps, is run by a first-class water-power. The mine was opened about the middle of 1881, and run for about two months. It proved unproductive, and has been idle until towards the close of 1882 work was recommenced with very flattering results. An effort is being made to turn the river from its bed for a distance of upwards of half a mile, and thus enable the company to work the rich deposits known to exist on the bottom. The mill will be run with ore from the Pigeon Roost belt that has recently been discovered on the north end of the property, and with the 10 stamps restored to the mill the mine will doubtless become a large bullion producer.

The Bell mine, 2½ miles southeast of Auraria, is a new mine not fully opened. Nearly the whole year was consumed in securing a water supply and perfecting arrangements for future operations. The mine is located on the Calhoun and McGuire belt of veins and shows some rich specimens of ore. It is generally thought that the supply of ore will be sufficient for the 10-stamp mill, with which the mine is equipped, but the water supply is insufficient.

The Chestatee mine, 2½ miles east of Auraria, commenced operations in December. The cuts show ore supply of good quality, and it is believed by the company that it will be found in large quantity. The mill of 40 stamps is a fine example of mill architecture, and is furnished with all the improvements and appliances for saving gold.

Near Auraria, Whim Hill has recently been examined with reference to reopening. The surface is diversified, and affords superior opportunities for exploitation and drainage; float ore of good quality is abundant everywhere, and the veins either of the Pigeon Roost or other belts are good wherever cut. Water can be readily supplied from the Hand ditch. Should this be reopened it will likely add largely to the bullion returns of the county.

There are a number of other locations in the vicinity of Auraria equally deserving of attention.

The Little Daisy mine, on lots 110, 111, 149, and 150, was worked during the summer by sluicing; the results were good, though but little machinery and few men were employed.

The following shows the number of stamps in the neighborhood of Auraria both in 1881 and 1882:

Mine.	Stamps in 1881.	Stamps in 1882.
Chicago and Georgia	10	10
Auraria	15	15
Danæ	......	10
Bell	10	10
Hightower	10	10
Wells	10	10
Cleveland or Baggs Branch	10	10
Chestatee	......	40
Total	65	115

The product of the section immediately about Auraria was approximately $40,000.

The water supply of the mines of Lumpkin County has become a very important question, as the present facilities are daily growing inadequate. The Hand ditch is under contract for enlargement, which would double its capacity. The Ivey mine has its own ditch from the headwaters of Cane Creek nearly completed. The Dahlonega Ditch Company will, if its legal troubles are settled favorably, materially enlarge its ditch to supply the pressing wants of the mines south of Auraria.

Professor Beck, of Dahlonega, who has been extensively engaged in the survey and other examination of the whole section, states that the Dawson County ditch, which is of greater capaci'y than any now in operation in Lumpkin County, could easily be brought to the vicinity of Dahlonega, and afford a large supply at a higher level than the courthouse in that place. He is also of the opinion that some of the bolder streams from beyond the Blue Ridge could be brought to Lumpkin County, and that the fear expressed by many of inadequate supplies of water for hydraulic operations is groundless.

DAWSON COUNTY.

The gold belts of Lumpkin County extend southwest through Dawson. The condition of the mining interests remains unchanged, with a production neither increasing nor diminishing. The Baby, Magic, Gnome, Amicalola, and Kinmore mines were the only ones in operation. They are worked under the control of the Cincinnati Consolidated Mining Company. The completion of their ditch has been retarded, and until an abundant supply of water is obtained little change need be expected. When the ditch is finished we may look for a large and profitable return from these mines.

The individual operators in a small way took out about their usual amount of bullion.

The total production of the county was about $15,000.

Still further to the southwest the work in *Cherokee* County was without much change. Preliminary operations for more extensive production were reported at the Franklin, Pascoe, and Strickland mines. At the Sixes and Cherokee mines work is unchanged.

In *Bartow*, *Paulding*, *Cobb*, and *Carroll* Counties mining is done on a small scale, and the same may be said in regard to the Abacoochee and Pinetuckee, in the contiguous counties of Alabama.

The production of all the gold-bearing section southwest of Dawson County slightly increased during the year owing to more extensive operations at the principal mines. The gold is carried away by country traders or commercial travelers, and statistics are difficult to obtain, but by a comparison from all sources of information the yield may be placed at $20,000.

At Elijay, in *Gilmore* County, Henry C. Freeman's mine was prepared for continuous work.

In *Towns*, *Union*, and *Fannin* Counties mining operations were carried on by individual operators in a number of localities. All reports received speak of small yields, but regard the aggregate as considerable. Ten thousand dollars would cover the whole production.

In *Hall* County the Glades mine was idle.

In *McDuffie* County a little sluicing was done at the Sea mine and also at the Seal mine in *Lincoln* County, 6 miles northeast of Lincolnton. The two mines probably produced $3,500.

The Magruder mine in *Lincoln* County was exploited to some extent, but as it carries much galena and requires a smelting treatment, it is not likely to add to the bullion product unless local smelters be erected for treating the concentrated sulphurets of this section, or it be shipped to smelters in other places.

The Cullowhee mine, near Gainsville, was not in operation. The ore is a heavy sulphuret of more than average value, and the vein is 5 feet wide with 2 feet of sulphurets. The erection of chlorination works at Gainsville for the treatment of the ore from this mine is under consideration, and some preliminary steps are reported to have been taken.

The Merck mine was also partially developed.

The work of the year in Georgia was eminently successful in 1882, both in its steady prosecution and increase. New mines were selected with judgment, carefully equipped, and the work for the most part managed with prudence and economy.

The following is a summary of the reports received of the production, by counties:

	Production.
Rabun	$10,000
White	25,000
Lumpkin	225,000
Dawson	15,000
Cherokee, Cobb, Paulding, Carroll, Towns, Union, Fannin, Gilmore	30,000
Hall	2,500
Miscellaneous	5,000
Total	312,500

The reports were not in all cases official, and in others there was a slight tendency to overstate, as ascertained by comparison with express statements.

The movement that could be traced by express, mail, and private hands showed an amount of about $200,000. This did not include shipments from Atlanta and minor shipping points, which would probably amount to $50,000.

Mr. Hanna's estimate of the total production of the State, based upon a careful review of all reports received, is $254,500, which I believe to be a close estimate.

PART II.

GENERAL STATISTICS.

GENERAL STATISTICS.

[Wells, Fargo & Co., express and banking.]

San Francisco, *January* 1, 1883.

Dear Sir: The following is a copy of our annual statement of precious metals produced in the States and Territories west of the Missouri River, including British Columbia (and receipts in San Francisco by express from the west coast of Mexico), during 1882, which shows aggregate products as follows: Gold, $30,193,355; silver, $50,155,288; copper, $4,055,037; lead, $8,008,155. Total gross result, $92,411,835.

California shows a decrease in gold of $1,696,351. Nevada shows a total falling off of $1,484,188; the yield from the Comstock being $1,333,018 as against $1,726,162 in 1881—a decrease of $393,144. The product of Eureka district is $3,176,656 as against $4,127,265 in 1881—a decrease of $953,609. Utah, Colorado, New Mexico, and Arizona each show a notable increase on the products of last year.

The increase of transportation facilities for carrying bullion, pig metal, ores, &c., has increased the difficulty of verifying the reports of products from several important localities; and the general tendency is to exaggeration when the actual values are not obtainable from authentic sources, but the aggregate result as shown herein we think may be relied on with reasonable confidence.

States and Territories.	Gold dust and bullion by express.	Gold dust and bullion by other conveyances.	Silver bullion by express.	Ores and base bullion by freight.	Total.
California	$14, 733, 643	$736, 682	$509, 342	$352, 831	$16, 332, 498
Nevada	752, 506		6, 588, 023	3, 022, 847	10, 363, 376
Oregon	431, 024	215, 512			646, 536
Washington	93, 892	46, 946			140, 838
Alaska		240, 000			240, 000
Idaho	1, 091, 208	191, 568	882, 890	1, 160, 072	3, 325, 738
Montana	2, 150, 000	215, 000	4, 065, 000	1, 574, 000	8, 004, 000
Utah	76, 954	6, 201	3, 139. 020	4, 921, 000	8, 143, 175
Colorado	2, 536, 500		4, 803, 925	18, 592, 840	25, 933, 265
New Mexico	43, 728	21, 864	919, 047	2, 682, 493	3, 667, 132
Texas			257, 597		257, 597
Arizona	386, 517	100, 000	5, 631, 083	3, 180, 667	9, 298, 267
Dakota	2, 595, 570	259, 557			2, 855, 127
Mexico (west coast)	510, 192		1, 710, 249	312, 000	2, 532, 441
British Columbia	537, 476	134, 369			671, 845
	25, 939, 210	2, 167, 699	28, 506, 176	35, 798, 750	92, 411, 835

The gross yield for 1882, shown above, segregated, is approximately as follows:

	Per cent.	Amount.
Gold	32. 67	$30, 193, 355
Silver	54. 27	50, 155, 288
Copper	4. 39	4, 055, 037
Lead	8. 67	8, 008, 155
Total		92, 411, 835

Annual products of lead, copper, silver, and gold in the States and Territories west of the Missouri River, 1870–'82.

Year.	Products as per W., F. & Co.'s statements, including amounts from British Columbia and west coast of Mexico.	Product after deducting amounts from British Columbia and west coast of Mexico.	The net product of the States and Territories west of the Missouri River, exclusive of British Columbia and west coast of Mexico, divided, is as follows:			
			Lead.	Copper.	Silver.	Gold.
1870	$54,000,000	$52,150,000	$1,080,000	....	$17,320,000	$33,750,000
1871	58,284,000	55,784,000	2,100,000	....	19,286,000	34,398,000
1872	62,236,959	60,351,824	2,250,000	....	19,924,429	38,177,395
1873	72,258,693	70,139,860	3,450,000	....	27,483,302	39,206,558
1874	74,401,045	71,965,610	3,800,000	....	29,699,122	38,466,488
1875	80,889,057	76,703,433	5,100,000	....	31,635,239	39,968,194
1876	90,875,173	87,219,859	5,040,000	....	39,292,924	42,886,935
1877	98,421,754	95,811,582	5,085,250	....	45,846,109	44,880,223
1878	81,154,622	78,276,167	3,452,000	....	37,248,137	37,576,030
1879	75,349,501	72,688,888	4,185,769	....	37,032,857	31,470,262
1880	80,167,936	77,232,512	5,742,390	$898,000	38,033,055	32,559,067
1881	84,504,417	81,198,474	6,361,902	1,195,000	42,987,613	30,653,959
1882	92,411,835	89,207,549	8,008,155	4,055,037	48,133,039	29,011,318

The exports of silver during the present year to Japan, China, India, the Straits, &c., have been as follows: From Southampton, $27,390,000. From Venice, $9,695,000. From Marseilles, $806,000. From San Francisco, $5,375,000. Total, $43,266,000, as against $27,000,000 from the same places in 1881.

JNO. J. VALENTINE,
Vice-President and General Superintendent.

Deposits and purchases of gold and silver bullion during the fiscal year ended June 30, 1882.

Description.	Mints.					Assay offices.					Total.
	Philadelphia.	San Francisco.	Carson.	Denver.	New Orleans.	New York.	Boisé.	Helena.	Charlotte.	Saint Louis.	
GOLD.											
United States bullion (domestic production)	$143, 250 70	$21, 691, 855 40	$1, 016, 808 04	$458, 847 07	$7, 196 67	$7, 166, 935 87	132	$587, 443 78	$79, 683 39	$185 23	$31, 298, 511 97
United States coin	209, 228 61	9, 543 20	....	....	9, 868 41	370, 374 83	....	....	341 75	....	599, 356 80
Foreign bullion	33, 697 95	3, 013, 683 76	....	....	1, 464 59	9, 734, 960 74	....	....	....	....	12, 783, 807 04
Foreign coin	41, 490 46	2, 881, 438 64	....	....	56, 849 08	17, 324, 357 53	....	....	675 07	....	20, 304, 810 78
Jewelers' bars, old plate, &c.	617, 481 51	26, 663 61	158 01	....	31, 572 73	1, 087, 258 40	....	24 83	1, 006 58	6, 000 69	1, 770 166 36
Total..........	1, 045, 149 23	27, 623, 184 61	1, 016, 966 05	458, 847 07	106, 951 48	35, 683, 887 37	146, 305 82	587, 468 61	81, 706 79	6, 185 92	66, 756, 652 95
Redeposits { Fine bars	56, 520, 718 20	....	....	....	....	165, 156-45	....	....	....	....	56, 685, 874 65
Redeposits { Unparted bars..	960, 859 40	101, 206 48	....	....	2, 912 74	145, 043 27	....	97, 006 92	182 57	....	1, 307, 211 38
Total gold received and operated upon..........	58, 526, 726 83	27, 724, 391 09	1, 016, 966 05	458, 847 07	109, 864 22	35, 994, 087 09	146, 305 82	684, 475 53	81, 889 36	6, 185 92	124, 749, 738 98
SILVER.											
United States bullion (domestic production)	9, 409, 478 48	9, 482, 214 55	1, 003, 320 62	7, 053 02	4, 534, 327 17	6, 375, 176 76	2, 318 43	142, 136 20	542 00	20 95	30, 956, 588 18
United States coin..........	81, 282 62	4, 777 05	29 79	....	22, 577 70	18, 703 98	....	....	77 32	123 94	127, 572 40
Foreign bullion	36, 324 57	1, 144, 168 20	....	....	18, 924 47	227, 209 71	....	....	....	....	1, 426, 626 95
Foreign coin	10, 603 52	11, 509 80	....	....	656, 515 06	182, 160 37	....	....	47 47	....	860, 836 22
Jewelers' bars, old plate, &c..	93, 564 10	3, 684 53	18 83	....	24, 346 27	226, 501 04	....	14 80	104 12	633 98	348, 867 67
Total..........	9, 631, 253 29	10, 646, 354 13	1, 003, 369 24	7, 053 02	5, 256, 690 67	7, 029, 751 86	2, 318 43	142, 151 00	770 91	778 87	33, 720, 491 42
Redeposits { Fine bars	1, 287. 434 00	343, 405 60	....	....	....	17, 632 55	....	....	....	....	1, 648, 472 15
Redeposits { Unparted bars..	12, 640 23	1, 346 22	....	....	894 14	120, 875 80	....	3, 155 05	2 08	....	138, 913 52
Total silver received and operated upon..........	10, 931, 327 52	10, 991, 105 95	1, 003, 369 24	7, 053 02	5, 257, 584 81	7, 168, 260 21	2, 318 43	145, 306 05	772 99	778 87	35, 507, 877 09
Gold and silver deposits and purchases..........	10, 676, 402 52	38, 269, 538 74	2, 020, 335 29	465, 900 09	5, 363, 642 15	42, 713, 639 23	148, 624 25	729, 619 61	82, 477 70	6, 964 79	100, 477, 144 37
Redeposits { Gold	57, 481, 577 60	101, 206 48	....	....	2, 912 74	310, 199 72	....	97, 006 92	182 57	....	57, 993, 086 03
Redeposits { Silver	1, 300, 074 23	344, 751 82	....	....	894 14	138, 508 35	....	3, 155 05	2 08	....	1, 787, 385 67
Total gold and silver received and operated upon..........	69, 458, 054 35	38, 715, 497 04	2, 020, 335 29	465, 900 09	5, 367, 449 03	43, 162, 347 30	148, 624 25	829, 781 58	82, 662 35	6, 964 79	160, 257, 616 07

Deposits and purchases of gold and silver bullion during the calendar year ended December 31, 1882.

Description.	Mints.					Assay offices.					Total.
	Philadelphia.	San Francisco.	Carson.	Denver.	New Orleans.	New York.	Boisé.	Helena.	Charlotte.	Saint Louis.	
GOLD.											
United States bullion (domestic production)	$201, 454 38	$21, 573, 084 45	$1, 172, 002 72	$495, 379 55		$7, 095, 323 41	$147, 162 25	$601, 353 58	$92, 226 23	$262 25	$31, 378, 248 82
United States coin	177, 331 35	4, 261 51			$13, 788 24	213, 580 20			152 82	34 79	409, 148 91
Foreign bullion	49, 405 71	2, 610, 190 85			3, 418 42	953, 221 97				92 89	3, 616, 329 84
Foreign coin	33, 605 75	1, 893, 535 50	177 84		46, 847 11	2, 747, 853 47			270 27		4, 722, 289 94
Jewelers' bars, old plate, &c.	634, 983 48	22, 094 34	75 33		40, 042 38	1, 083, 655 98		24 84	804 93	13, 564 97	1. 795, 246 25
Total	1, 096, 780 67	26, 103, 166 65	1, 172, 255 89	495, 379 55	104, 096 15	12, 093, 635 03	147, 162 25	601, 378 42	93, 454 25	13, 954 90	41, 921, 263 76
Redeposits. Fine bars	16, 785, 596 41				3, 890 34	800, 502 14					17, 589, 988 89
Redeposits. Unparted bars	611, 793 56	112, 220 16		998 05	2, 912 75	504, 750 81		77, 290 88	177 47		1, 310, 143 68
Total gold received and operated upon	18, 494, 170 64	26, 215, 386 81	1, 172, 255 89	496, 377 60	110, 899 24	13, 398, 887 98	147, 162 25	678, 669 30	93, 631 72	13, 954 90	60, 821, 396 33
SILVER.											
United States bullion (domestic production)	9, 708, 416 29	7, 863, 687 99	1, 085, 564 95	7, 157 88	5, 890, 723 92	6, 739, 179 52	2, 285 95	103, 119 22	635 38	21 85	31, 400, 792 95
United States coin	547, 984 99	3, 922 42	43 41		24, 360 21	11, 036 47			134 61	47 32	587, 529 43
Foreign bullion	302 73	1, 236, 297 98			27, 813 24	366, 094 86				13 67	1, 630, 522 48
Foreign coin	202, 494 57	9, 335 74	16 99		786, 685 77	158, 690 55			18 28	275 46	1, 157, 517 36
Jewelers' bars, old plate, &c.	98, 851 06	2, 784 90	1 99		28, 011 80	253, 783 02		14 80	98 78	1, 345 92	384, 892 27
Total	10, 558, 049 64	9, 116, 029 03	1, 085, 627 34	7, 157 88	6, 757, 594 94	7, 528, 784 42	2, 285 95	103, 134 02	887 05	1, 704 22	35, 161, 254 49
Redeposits. Fine bars	1, 888, 352 15	121, 904 95				20, 922 04					2, 031, 179 14
Redeposits. Unparted bars	8, 300 21	27, 229 83			894 14	101, 918 05		2, 714 97	1 09		141, 058 29
Total silver received and operated upon	12, 454, 702 00	9, 265, 163 81	1, 085, 627 34	7, 157 88	6, 758, 489 08	7, 651, 624 51	2, 285 95	105, 848 99	888 14	1, 704 22	37, 333, 491 92
Gold and silver deposits and purchases	11, 654, 830 31	35, 219, 195 68	2, 257, 883 23	502, 537 43	6, 861, 691 09	19, 622, 419 45	149, 448 20	704, 512 44	94, 341 30	15, 659 12	77, 082, 518 25
Redeposits. Gold	17, 397, 389 97	112, 220 16		998 05	6, 803 09	1, 305, 252 95		77, 290 88	177 47		18, 900, 132 57
Redeposits. Silver	1, 896, 652 36	149, 134 78			894 14	122, 840 09		2, 714 97	1 09		2, 172, 237 43
Total gold and silver received and operated upon	30, 948, 872 64	35, 480, 550 62	2, 257, 883 23	503, 535 48	6, 869, 388 32	21, 050, 512 49	149, 448 20	784, 518 29	94, 519 86	15, 659 12	98, 154, 888 25

Deposits of gold of domestic production during the fiscal year ended June 30, 1882.

Locality.	Mints.					Assay offices.					Total.
	Philadelphia.	San Francisco.	Carson.	Denver.	New Orleans.	New York.	Boisé.	Helena.	Charlotte.	Saint Louis.	
Alabama	$211 29					$1, 202 79					$1, 414 08
Alaska		$14, 928 98									14, 928 98
Arizona	578 44	338, 959 35				499 09					340, 036 88
California	1, 493 54	6, 558, 830 77	$124, 947 33			44, 944 35					6, 730, 215 99
Colorado	7, 760 41			$458, 847 07		1, 595, 149 25					2, 061, 756 73
Dakota	38, 273 86					3, 367, 043 18					3, 405, 317 04
Georgia	5, 213 11					73, 075 44			$28, 658 10		106, 946 65
Idaho	2, 327 48	434, 914 06				79, 466 31	$87, 975 43				604, 683 28
Maine	4, 770 03					746 83					5, 516 86
Maryland	494 85										494 85
Michigan						2 16					2 16
Montana	1, 836 00	23, 670 29				727, 431 44		$587, 443 78		$185 23	1, 340, 566 74
Nevada	3, 706 03	319, 671 44	891, 860 71			162, 345 84					1, 377, 584 02
New Mexico	674 44	878 51				61, 403 96					62, 956 91
North Carolina	25, 616 00					4, 128 41			38, 616 54		68, 360 95
Oregon	145 77	563, 751 50					58, 330 39				622, 227 66
South Carolina	2, 672 22					576 48			12, 408 75		15, 657 45
Tennessee	601 45					259 18					860 63
Utah	3, 207 29	38, 156 78			$7, 196 67	15, 345 40					63, 906 14
Virginia	6, 143 11					4, 929 54					11, 072 65
Washington Territory		22, 163 52									22, 163 52
Wyoming	2, 393 64	860 95				1, 156 04					4, 410 63
Refined gold	7, 264 31	13, 266, 200 43				623, 262 38					13, 896, 727 12
Parted from silver						403, 967 80					403, 967 80
Other sources	27, 867 43	108, 868 82									136, 736 25
Total gold	143, 250 70	21, 691, 855 40	1, 016, 808 04	458, 847 07	7, 196 67	7, 166, 935 87	146, 305 82	587, 443 78	79, 683 39	185 23	31, 298, 511 97

Deposits of gold of domestic production during the calendar year 1882.

Locality.	Mints.					Assay offices.					Total.
	Philadelphia.	San Francisco.	Carson.	Denver.	New Orleans.	New York.	Boisé.	Helena.	Charlotte.	Saint Louis.	
Alabama	$211 30					$1, 478 94					$1, 690 24
Alaska		$34, 010 70									34, 010 70
Arizona	1, 050 34	245, 203 79				9, 832 78					256, 086 91
California	2, 014 10	6, 402, 364 65	$84, 546 52			34, 969 37					6, 523, 894 64
Colorado	4, 151 93	100 16		$495, 379 56		1, 693, 745 26				$56 45	2, 193, 433 36
Dakota	80, 765 58					3, 060, 972 06					3, 141, 737 64
Georgia	5, 278 66					77, 965 97			$31, 262 55		114, 507 18
Idaho	10, 131 87	366, 613 30				76, 587 26	$103, 950 24				557, 282 67
Maryland	754 21										754 21
Michigan						5 12					5 12
Montana	2, 802, 44	32, 599 66	3, 385 82			762, 504 65	354 54	$601, 353 58		205 79	1, 403, 206 48
Maine	4, 665 97										4, 665 97
Nevada		460, 377 74	1, 084, 070 39			188, 350 04					1, 732, 798 17
New Mexico	1, 258 79	1, 210 93				69, 519 81					71, 989 53
North Carolina	31, 991 70					4, 849 50			45, 631 64		82, 472 84
Oregon	145 76	541, 232 32					42, 857 45				584, 235 53
South Carolina	935 83								15, 332 06		16, 267 89
Tennessee						226 88					226 88
Utah	5, 448 28	44, 123 85				27, 151 96					76, 724 09
Virginia	1, 793 54					11, 747 20					13, 540 74
Washington Territory		26, 672 35									26, 672 35
Wyoming	2, 053 24					401 71					2, 454 95
Refined bullion	7, 264 33	13, 331, 926 46				961, 453 56					14, 300, 644 35
Parted from silver						113, 561 36					113, 561 36
Other sources	38, 736 50	86, 648 50									125, 385 00
Total	201, 454 37	21, 573, 084 41	1, 172, 002 73	495, 379 56		7, 095, 323 43	147, 162 23	601, 353 58	92, 226 25	262 24	31, 378, 248 80

Deposits of silver of domestic production during the fiscal year ending June 30, 1882.

Locality.	Mints.					Assay offices.					Total.
	Philadelphia.	San Francisco.	Carson.	Denver.	New Orleans.	New York.	Boisé.	Helena.	Charlotte.	Saint Louis.	
Alabama	$1 11					$4 78					$5 89
Alaska		$162 22									162 22
Arizona	61, 998 17	4, 085, 427 78				363, 466 06					4, 510, 892 01
California	10 87	231, 699 50	$16, 281 89			852 34					248, 844 60
Colorado	1, 356 60			$7, 053 02		761, 854 99					770, 264 61
Dakota	453 37					29, 139 93					29, 593 30
Georgia	44 16					127 84			$164 48		336 48
Idaho	33 37	70, 034 07				20, 764 76	$1, 537 20				92, 369 40
Maine	21 38										21 38
Michigan (Lake Superior)	7, 710 73					15, 801 18					23, 511 91
Montana	1, 293 24	64, 275 36				844, 927 05		$142, 136 20		$20 95	1, 052, 652 80
Nevada	17 99	2, 697, 179 13	987, 038 73			106, 952 92					3, 791, 188 77
New Mexico	3 79	14 03				496, 035 40					496, 053 22
North Carolina	197 66					4 52			337 96		540 14
Oregon	95	5, 839 92					781 23				6, 622 10
South Carolina	61 37								39 56		100 93
Tennessee	2 30					37					2 67
Utah	22, 757 10	385, 285 21				2, 360, 516 11					2, 768, 558 42
Virginia	25 40					26 81					52 21
Washington Territory		215 86									215 86
Wyoming	17 39	2 79									20 18
Refined silver	9, 308, 812 85	1, 328, 385 97			$4, 534, 327 17	1, 292, 901 21					16, 464, 427 20
Parted from gold						81, 800 49					81, 800 49
Other sources	4, 658 68	613, 692 71									618, 351 39
Total silver	9, 409, 478 48	9, 482, 214 55	1, 003, 320 62	7, 053 02	4, 534, 327 17	6, 375, 176 76	2, 318 43	142, 136 20	542 00	20 95	30, 956, 588 18

Deposits of silver of domestic production during the calendar year ended December 31, 1882.

Locality.	Mints.					Assay offices.					Total.
	Philadelphia.	San Francisco.	Carson.	Denver.	New Orleans.	New York.	Boisé.	Helena.	Charlotte.	Saint Louis.	
Alabama	$1 11					$9 89					$11 00
Alaska		$302 20									302 20
Arizona	24, 238 20	2, 952, 824 12				356, 366 27					3, 333, 428 59
California	19 89	349, 206 19	$17, 296 28			262 26					366, 784 62
Colorado	3, 484 41	1 22		$7, 157 88		580, 751 19				$0 69	591, 395 39
Dakota	724 69					75, 196 74					75, 921 43
Georgia	54 61					368 87			$171 31		594 79
Idaho	60, 217 20	43, 547 07				69, 912 79	$1, 669 48				175, 346 54
Maine	20 83										20 83
Maryland	77										77
Michigan (Lake Superior)	10, 764 05					14, 240 97					25, 005 02
Montana	1, 960 48	151, 576 37				1, 234, 573 03	5 53	103, 119 22		21 15	1, 491, 255 78
Nevada	878 56	2, 731, 393 88	1, 068, 268 67			59, 068 52					3, 859, 609 63
New Mexico	922, 860 35	41 96				539, 395 77					1, 462, 298 08
North Carolina	200 03					40 77			382 16		622 96
Oregon	95	5, 311 05					610 94				5, 922 94
South Carolina	18 56								81 91		100 47
Tennessee						1 44					1 44
Utah	51, 896 19	606, 235 55				2, 377, 877 96					3, 036, 009 70
Virginia	13 00					68 43					81 43
Washington Territory		252 17									252 17
Wyoming	14 82					3 83					18 65
Refined silver	8, 626, 046 56	461, 365 93			$5, 890, 723 92	1, 413, 816 35					16, 391, 952 76
Parted from gold						17, 224 44					17, 224 44
Other sources	5, 001 03	561, 630 28									566, 631 31
Total silver	9, 708, 416 29	7, 863, 687 99	1, 085, 564 95	7, 157 88	5, 890, 723 92	6, 739, 179 52	2, 285 95	103, 119 22	635 38	21 84	31, 400, 792 94

Gold and silver of domestic production deposited at the mints and assay offices from their organization to the close of the fiscal year ended June 30, 1882.

Locality.	Gold.	Silver.	Total.
Alabama	$221, 886 05		$221, 886 05
Alaska	46, 254 51	$167 30	46, 421 81
Arizona	2, 963, 537 38	10, 272, 443 50	13, 235, 980 88
California	716, 354, 816 23	2, 563, 593 32	718, 918, 409 55
Colorado	39, 393, 894 91	21, 928, 710 88	61, 322, 605 79
Dakota	14, 050, 169 82	50, 869 52	14, 101, 039 34
Georgia	7, 922, 794 17	874 46	7, 923, 668 63
Idaho	25, 288, 037 98	897, 151 36	26, 185, 189 34
Indiana	40 13		40 13
Maine	5, 516 86	21 38	5, 538 24
Maryland	1, 087 91		1, 087 91
Massachusetts		917 56	917 56
Michigan (Lake Superior)	126 15	3, 500, 830 93	3, 500, 957 08
Montana	51, 481, 833 94	6, 580, 549 99	58, 062, 383 93
Nevada	16, 516, 639 98	81, 226, 931 53	97, 743, 571 51
New Hampshire	11, 020 55		11, 020 55
New Mexico	1, 687, 369 93	2, 979, 750 51	4, 667, 120 44
North Carolina	10, 739, 759 24	46, 556 85	10, 786, 316 09
Oregon	16, 816, 275 39	40, 307 01	16, 856, 582 40
South Carolina	1, 435, 390 36	175 30	1, 435, 565 66
Tennessee	86, 616 20	4 66	86, 620 86
Utah	531, 152 72	13, 056, 896 40	13, 588, 049 12
Vermont	10, 981 27	43 50	11, 024 77
Virginia	1, 694, 509 35	82 86	1, 694, 592 21
Washington Territory	259, 027 88	326 82	259, 354 70
Wyoming	727, 992 24	11, 818 18	739, 810 42
Refined bullion	231, 261, 345 34	73, 522, 397 63	304, 783, 742 97
Parted from silver	16, 699, 768 48		16, 699, 768 48
Contained in silver	9, 322, 268 97		9, 322, 268 97
Parted from gold		7, 073, 251 68	7, 073, 251 68
Contained in gold		526, 284 79	526, 284 79
Other sources	10, 503, 840 51	32, 574, 302 44	43, 078, 142 95
Total	1, 176, 033, 954 45	256, 855, 260 36	1, 432, 889, 214 81

Gold and silver of domestic production deposited at the mints and assay offices from their organization to the close of the calendar year ended December 31, 1882.

Locality.	Gold.	Silver.	Total.
Alabama	$222, 582 49	$11 00	$222, 593 49
Alaska	78, 275 67	446 55	78, 722 22
Arizona	3, 108, 045 18	11, 734, 417 01	14, 842, 462 19
California	720, 100, 949 71	2, 798, 452 22	722, 899, 401 93
Colorado	40, 637, 473 70	22, 247, 951 06	62, 885, 424 76
Dakota	15, 741, 518 16	101, 218 16	15, 842, 736 32
Georgia	7, 983, 172 85	1, 211 71	7, 984, 384 56
Idaho	25, 716, 643 78	1, 043, 053 78	26, 759, 697 56
Indiana	40 13		40 13
Maine	5, 516 86	21 38	5, 538 24
Maryland	1, 600 14	77	1, 600 91
Massachusetts		917 56	917 56
Michigan (Lake Superior)	129 11	3, 516, 536 79	3, 516, 665 90
Montana	52, 462, 123 49	7, 482, 505 51	59, 944, 629 00
Nevada	17, 490, 490 63	83, 401, 671 19	100, 892, 161 82
New Hampshire	11, 020 55		11, 020 55
New Mexico	1, 739, 399 75	4, 094, 912 40	5, 834, 312 15
North Carolina	10, 786, 647 58	46, 916 85	10, 833, 564 43
Oregon	17, 252, 585 33	44, 836 35	17, 297, 421 68
South Carolina	1, 445, 873 17	246 53	1, 446, 119 70
Tennessee	86, 734 19	5 74	86, 739 93
Utah	584, 433 20	14, 663, 392 65	15, 247, 825 85
Vermont	10, 981 27	43 50	11, 024 77
Virginia	1, 703, 282 90	136 27	1, 703, 419 17
Washington Territory	281, 366 74	538 26	281, 905 00
Wyoming Territory	729, 336 17	11, 827 94	741, 164 11
Refined bullion	240, 039, 174 59	82, 441, 841 04	322, 481, 015 63
Parted from silver	16, 699, 768 48		16, 699, 768 48
Contained in silver	9, 322, 268 97		9, 322, 268 97
Parted from gold		7, 073, 251 69	7, 073, 251 69
Contained in gold		526, 284 79	526, 284 79
Other sources	10, 584, 797 34	32, 877, 370 13	43, 462, 167 47
Total	1, 194, 826, 232 13	274, 110, 018 83	1, 468, 936, 250 96

Coinage executed during the fiscal year ended June 30, 1882.

Denomination.	Philadelphia.		San Francisco.		Carson.		New Orleans.		Total.	
	Pieces.	Value.	Pieces.	Value.	Pieces.	Value.	Pieces.	Value.	Pieces.	Value.
GOLD.										
Double-eagles	25	$500 00	710,000	$14,200,000 00	18,171	$363,420 00			728,196	$14,563,920 00
Eagles	3,670,005	36,700,050 00	740,000	7,400,000 00	16,766	167,660 00	10,170	$101,700 00	4,436,941	44,369,410 00
Half-eagles	4,594,345	22,971,725 00	1,450,000	7,250,000 00	50,446	252,230 00			6,094,791	30,473,955 00
Three dollars	25	75 00							25	75 00
Quarter-eagles	25	62 50							25	62 50
Dollars	6,025	6,025 00							6,025	6,025 00
Total gold	8,270,450	59,678,437 50	2,900,000	28,850,000 00	85,383	783,310 00	10,170	101,700 00	11,266,003	89,413,447 50
SILVER.										
Dollars	11,051,075	11,051,075 00	11,000,000	11,000,000 00	763,000	763,000 00	4,958,000	4,958,000 00	27,772,075	27,772,075 00
Half-dollars	11,075	5,537 50							11,075	5,537 50
Quarter-dollars	13,075	3,268 75							13,075	3,268 75
Dimes	25,075	2,507 50							25,075	2,507 50
Total silver	11,100,300	11,062,388 75	11,000,000	11,000,000 00	763,000	763,000 00	4,958,000	4,958,000 00	27,821,300	27,783,388 75
MINOR.										
Five cents	4,400,775	220,038 75							4,400,775	220,038 75
Three cents	3,475	104 25							3,475	104 25
One cent	42,461,475	424,614 75							42,461,475	424,614 75
Total minor	46,865,725	644,757 75							46,865,725	644,757 75
Total coinage	66,236,475	71,385,584 00	13,900,000	39,850,000 00	848,383	1,546,310 00	4,968,170	5,059,700 00	85,953,028	117,841,594 00

Coinage executed during the calendar year ended December 31, 1882.

Denomination.	Philadelphia.		San Francisco.		Carson.		New Orleans.		Total.	
	Pieces.	Value.	Pieces.	Value.	Pieces.	Value.	Pieces.	Value.	Pieces.	Value.
GOLD.										
Double-eagles	630	$12,600 00	1,125,000	$22,500,000 00	31,140	$782,800 00			1,164,770	$23,295,400 00
Eagles	2,324,480	23,244,800 00	132,000	1,320,000 00	6,764	67,640 00	10,820	$108,200 00	2,474,064	24,740,640 00
Half-eagles	2,514,560	12,572,800 00	969,000	4,845,000 00	82,817	414,085 00			3,566,377	17,831,885 00
Three dollars	1,540	4,620 00							1,540	4,620 00
Quarter-eagles	4,040	10,100 00							4,040	10,100 00
Dollars	5,040	5,040 00							5,040	5,040 00
Total gold	4,850,290	35,849,960 00	2,226,000	28,665,000 00	128,721	1,264,525 00	10,820	108,200 00	7,215,831	65,887,685 00
SILVER.										
Dollars	11,101,100	11,101,100 00	9,250,000	9,250,000 00	1,133,000	1,133,000 00	6,090,000	6,090,000 00	27,574,100	27,574,100 00
Half-dollars	5,500	2,750 00							5,500	2,750 00
Quarter-dollars	16,300	4,075 00							16,300	4,075 00
Dimes	3,911,100	391,110 00							3,911,100	391,100 00
Total silver	15,034,000	11,499,035 00	9,250,000	9,250,000 00	1,133,000	1,133,000 00	6,090,000	6,090,000 00	31,507,000	27,972,035 00
MINOR.										
Five cents	11,476,600	573,830 00							11,476,600	573,830 00
Three cents	25,300	759 00							25,300	759 00
One cent	38,581,100	385,811 00							38,581,100	385,811 00
Total minor	50,083,000	960,400 00							50,083,000	960,400 00
Total coinage	69,967,290	48,309,395 00	11,476,000	37,915,000 00	1,261,721	2,397,525 00	6,100,820	6,198,200 00	88,805,831	94,820,120 00

Statement of coinage from the organization of the Mint to the close of the fiscal year ended June 30, 1882.

GOLD COINAGE.

Period.	Double eagles.	Eagles.	Half eagles.	Three dollars.	Quarter eagles.	Dollars.	Total.
1793 to 1848		$25, 662, 270	$45, 265, 355		$5, 413, 815 00		$76, 341, 440 00
1849 to 1873	$646, 727, 980	29, 851, 820	22, 994, 390	$1, 169, 913	20, 804, 702 50	$19, 015, 633	740, 564, 438 50
1874	48, 283, 900	383, 480	809, 780	125, 460	516, 150 00	323, 920	50, 442, 690 00
1875	32, 748, 140	599, 840	203, 655	60	2, 250 00	20	33, 553, 965 00
1876	37, 896, 720	153, 610	71, 800	135	53, 052 50	3, 645	38, 178, 962 50
1877	43, 941, 700	56, 200	67, 835	4, 464	5, 780 00	2, 220	44, 078, 199 00
1878	51, 406, 340	155, 490	688, 680	137, 850	408, 900 00	1, 720	52, 798, 980 00
1879	37, 234, 340	1, 031, 440	1, 442, 130	109, 182	1, 166, 800 00	3, 020	40, 986, 912 00
1880	21, 515, 360	18, 836, 320	15, 790, 860	9, 090	3, 075 00	3, 030	56, 157, 735 00
1881	15, 345, 520	33, 389, 050	29, 982, 180	4, 698	9, 140 00	3, 276	78, 733, 864 00
1882	14, 563. 920	44, 369, 410	30, 473, 955	75	62 50	6, 025	89, 413, 447 50
Total	949, 663, 920	154, 488, 930	147, 790, 620	1, 560, 927	28, 383, 727 50	19, 362, 509	1, 301, 250, 633 50

SILVER COINAGE.

Period.	Trade dollars.	Dollars.	Half dollars.	Quarter dollars.	Twenty cents.
1793 to 1852		$2, 506, 890	$66, 249, 153 00	$3, 999, 040 50	
1853 to 1873		5, 538, 948	33, 596, 082 50	18, 002, 178 00	
1874	$3, 588, 900		1, 438, 930 00	458, 515 50	
1875	5, 697, 500		2, 853, 500 00	623, 950 00	$5, 858
1876	6, 132, 050		4, 985, 525 00	4, 106, 262 50	263, 560
1877	9, 162, 900		9, 746, 350 00	7, 584, 175 00	1, 440
1878	11, 378, 010	8, 573, 500	3, 875, 255 00	3, 703, 027 50	142
1879		27, 227, 500	225 00	112 50	
1880		27, 933, 750	3, 275 00	3, 837 50	
1881		27, 637, 955	4, 677 50	3, 638 75	
1882		27, 772, 075	5, 537 50	3, 268 75	
Total	35, 959, 360	127, 190, 618	122, 758, 510 50	38, 488, 006 50	271, 000

Period.	Dimes.	Half dimes.	Three cents.	Total.
1793 to 1852	$3, 890, 062 50	$1, 823, 298 90	$744, 927 00	$79, 213, 371 90
1853 to 1873	5, 170, 733 00	3, 083, 648 00	536, 923 20	65, 928, 512 70
1874	497, 255 80			5, 983, 601 30
1875	889, 560 00			10, 070, 368 00
1876	3, 639, 105 00			19, 126, 502 50
1877	2, 055, 070 00			28, 549, 935 00
1878	760, 891 00			28, 290, 825 50
1879	45 00			27, 227, 882 50
1880	1, 575 00			27, 942, 437 50
1881	3, 695 50			27, 649, 966 75
1882	2, 507 50			27, 783, 388 75
Total	16, 910, 500 30	4, 906, 946 90	1, 281, 850 20	347, 766, 792 40

MINOR COIN.

Period.	Five cents.	Three cents.	Two cents.	Cents.	Half cents.	Total.
1793 to 1873	$5, 276, 140 00	$805, 350 00	$912, 020 00	$4, 886, 452 44	$39, 926 11	$11, 919, 888 55
1874	244, 350 00	29, 640 00		137, 935 00		411, 925 00
1875	94, 650 00	12, 540 00		123, 185 00		230, 375 00
1876	132, 700 00	7, 560 00		120, 090 00		260, 350 00
1877	25, 250 00			36, 915 00		62, 165 00
1878	80 00	48 00		30, 566 00		30, 694 00
1879	1, 175 00	984 00		95, 639 00		97, 798 00
1880	1, 247 50	982 50		267, 741 50		269, 971 50
1881	177 75	32, 416 65		372, 515 55		405, 109 95
1882	220, 038 75	104 25		424, 614 75		644, 757 75
Total	5, 995, 809 00	889, 625 40	912, 020 00	6, 495, 654 24	39, 926 11	14, 333, 034 75

Bars manufactured during the fiscal year ended June 30, 1882.

Description.	Mints.					Assay offices.					Total.
	Philadelphia.	San Francisco.	Carson.	Denver.	New Orleans.	New York.	Boisé.	Helena.	Charlotte.	Saint Louis.	
GOLD.											
Fine bars	$238, 878 96					$12, 147, 674 90					$12, 386, 553 86
Unparted bars		$884 30		$458, 847 07			$146, 305 82	$684, 475 53	$81, 889 36	$6, 185 92	1, 378, 588 00
Mint bars						23, 739, 978 18					23, 739, 978 18
Total gold	238, 878 96	884 30		458, 847 07		35, 887, 653 08	146, 305 82	684, 475 53	81, 889 36	6, 185 92	37, 505, 120 04
SILVER.											
Fine bars	146, 163 05	718, 019 68				6, 905, 715 42					7, 769, 898 15
Standard bars						34, 478 09					34, 478 00
Unparted bars		16, 397 60		7, 053 02			2, 318 43	145, 306 05	772 99	778 87	172, 626 96
Mint bars						152, 199 74					152, 199 74
Total silver	146, 163 05	734, 417 28		7, 053 02		7, 092, 393 25	2, 318 43	145, 306 05	772 99	778 87	8, 129, 202 94
Total gold and silver	385, 042 01	735, 301 58		465, 900 09		42, 980, 046 33	148, 624 25	829, 781 58	82, 662 35	6, 964 79	45, 634, 322 98

Bars manufactured during the calendar year ended December 31, 1882.

Description.	Philadelphia.	San Francisco.	Carson.	Denver.	New Orleans.	New York.	Boisé.	Helena.	Charlotte.	Saint Louis.	Total.
GOLD.											
Fine bars	$209, 185 55					$9, 477, 654 62					$9, 686, 840 17
Standard bars						273, 342 50					273, 342 50
Unparted bars		$516 26		$496, 377 60			$147, 162 23	$678, 669 30	$93, 631 72	$13, 954 90	1, 430, 312 01
Mint bars						2, 434, 190 03					2, 434, 190 03
Sterling bars						686, 511 03					686, 511 03
Total gold	209, 185 55	516 26		496, 377 60		12, 871, 698 18	147, 162 23	678, 669 30	93, 631 72	13, 954 90	14, 511, 195 74
SILVER.											
Fine bars	273, 250 31	588, 378 47				7, 550, 491 67					8, 412, 120 45
Sterling bars	2, 777 46										2, 777 46
Standard bars		10, 540 79				34, 446 31					44, 987 10
Unparted bars				7, 157 88			2, 285 95	105, 848 99	888 15	1, 704 23	117, 885 20
Mint bars						152, 199 74					152, 199 74
Total silver	276, 027 77	598, 919 26		7, 157 88		7, 737, 137 72	2, 285 95	105, 848 99	888 15	1, 704 23	8, 729, 969 95
Total gold and silver	485, 213 32	599, 435 52		503, 535 48		20, 608, 835 90	149, 448 18	784, 518 29	94, 519 87	15, 659 13	23, 241, 165 69

Statement showing number of ounces, standard weight, of gold and silver bullion operated upon in the refineries of the United States mints at Philadelphia, San Francisco, and Carson, and the assay office at New York.

NEW YORK ASSAY OFFICE.

Calendar year 1882.	Sent to refineries.		
	Bullion containing gold.		Bullion free from gold.
	Gold, standard weight.	Silver, standard weight.	Silver, standard weight.
	Ounces. Dec.	*Ounces. Dec.*	*Ounces. Dec.*
January	42, 694. 000	404, 258. 00	148, 057. 00
February	36, 814. 000	337, 097. 00	65, 536. 00
March	36, 341. 000	333, 272. 00	119, 083. 00
April	36, 111. 000	253, 562. 00	167, 793. 00
May	41, 473. 000	356, 020. 00	115, 906. 00
June	27, 788. 000	210, 447. 00	55, 370. 00
July	55, 274. 000	368, 630. 00	90, 010. 00
August	37, 957. 000	261, 328. 00	90, 724. 00
September	43, 382. 000	366, 824. 00	94, 548. 00
October	44, 015. 000	339, 631. 00	56, 259. 00
November	42, 040. 000	439, 079. 00	43, 180. 00
December	45 618. 000	313, 338. 00	47, 649. 00
Total	489, 507. 000	3, 983, 486. 00	1, 094, 115. 00 3, 983, 486. 00
Total silver			5, 077, 601. 00

PHILADELPHIA MINT.

January	5, 906. 378	7, 417. 29	6, 506. 36
February	6, 200. 430	12, 480. 66	2, 324. 37
March	6, 394. 206	13, 086. 07	1, 612. 65
April	4, 492. 740	4, 178. 24	5, 564. 45
May	6, 699. 710	6, 788. 59	11, 822. 86
June	4, 618. 250	12, 826. 41	2, 385. 58
July	5, 590. 980	47, 211. 38	7, 135. 11
August	7, 014. 070	24, 681. 36	143. 62
September	6, 875. 299	15, 891. 07	3, 454. 34
October	9, 881. 010	5, 094. 51	18, 227. 25
November	8, 954. 540	16, 390. 20	4, 701. 28
December	6, 272. 200	20, 624. 59	1, 442. 63
Total	78, 899. 813	186, 670. 37	65, 320. 50 186, 670. 37
Total silver			251, 990. 87

SAN FRANCISCO MINT.

January	31, 624. 765	185, 885. 25	64, 498. 55
February	29, 128. 348	320, 077. 52	162, 187. 77
March	33, 743. 310	401, 956. 28	113, 012. 83
April	44, 105. 538	338. 501. 64	119, 832. 27
May	46, 497. 842	323, 913. 23	110, 929. 61
June	6, 731. 680	188, 063. 68	46, 822. 19
July	59, 098. 302	355, 300. 94	159, 541. 24
August	58, 683. 005	447, 837. 85	315, 735. 65
September	45, 968. 231	198, 952. 61	79, 096. 52
October	42, 279. 916	281, 325. 47	96, 802. 51
November	43, 227. 767	299, 722. 91	130, 373. 27
December	40, 070. 086	507, 127. 56	272, 849. 02
Total	481, 158. 790	3, 848, 664. 94	1, 671, 681. 43 3, 848, 664. 94
Total silver			5, 520, 346. 37

Statement showing number of ounces, standard weight, of gold and silver bullion operated upon in the refineries of the United States, &c.—Continued.

CARSON CITY MINT.

Calendar year 1882.	Sent to refineries.		
	Bullion containing gold.		Bullion free from gold.
	Gold, standard weight.	Silver, standard weight.	Silver, standard weight.
	Ounces. Dec.	*Ounces. Dec.*	*Ounces. Dec.*
January	7, 406. 220	73, 305. 74	Not reported.
February	6, 628. 260	75, 538. 21	Do.
March	6, 894. 320	106, 102. 12	Do.
April	5, 717. 480	99, 701. 90	Do.
May	6, 306. 720	110, 809. 45	Do.
June	2, 365. 730	45, 741. 10	Do.
July	7, 533. 200	98, 481. 43	Do,
August	7, 922. 370	106, 324. 10	Do.
September	7, 352. 360	99, 350. 09	Do.
October	7, 894. 030	103, 702. 99	Do.
November	6, 241. 300	98, 575. 30	Do.
December	4, 687. 080	50, 090. 78	Do.
Total	76, 949. 070	1, 067, 723. 21	
			1, 067, 723. 21
Total silver			1, 067, 723. 21

RECAPITULATION.

New York assay office	489, 507. 000	3, 983, 486. 00	1, 094, 115. 00
Philadelphia mint	78, 899. 813	186, 670. 37	65, 320. 50
San Francisco mint	481, 158. 790	3, 848, 664, 94	1, 671, 681. 43
Carson mint	76, 949. 070	1, 067, 723. 21	
Total	1, 126, 514. 673	9, 086, 544. 52	2, 831, 116. 93
			9, 086, 544. 52
Total silver			11, 917, 661. 45

Statement showing the number of standard ounces of silver bullion on hand at the coinage mints and New York assay office January 1, 1882, *and December* 31, 1882.

	Philadelphia.	San Francisco.	New Orleans.	Carson.	New York.	Total.
January 1, 1882	1, 297, 782. 44	1, 544, 008. 81	569, 977. 81	562, 059. 99	825, 696 77	4, 799, 525. 82
December 31, 1882	1, 782, 939. 38	1, 030, 858. 27	1, 141, 034. 38	520, 862. 24	891, 173. 17	5, 366, 867. 44
Increase	485, 156. 94		571, 056. 57		65, 476. 40	1, 121, 689. 91
Decrease		513, 150. 54		41, 197. 75		554, 348. 29

Net increase, 567,341.62 standard ounces; value, $660,179.34.

Statement showing the standard ounces of silver bullion purchased at the coinage mints during the calendar year 1882, *and coining value of the same.*

Mints.	Standard ounces.	Coining value.
Philadelphia	9, 955, 589. 96	$11, 584, 686 50
San Francisco	7, 612, 183. 01	8, 857, 812 95
New Orleans	5, 696, 627. 79	6, 628, 803 25
Carson City	932, 961. 00	1, 085, 627 34
Total	24, 197, 361 76	28, 156, 930 04

Monthly price of silver bullion 925 thousandths fine in London during the calendar year 1882.

Months.	Lowest.	Highest.	Average.
	d.	*d.*	*d.*
January	$51\frac{13}{16}$	$52\frac{1}{8}$	51.98
February	$51\frac{7}{8}$	$52\frac{1}{8}$	52.02
March	$51\frac{7}{8}$	$52\frac{1}{16}$	51.96
April	$52\frac{1}{16}$	$52\frac{1}{4}$	52.13
May	$52\frac{1}{8}$	$52\frac{7}{16}$	52.23
June	$51\frac{3}{4}$	$52\frac{3}{8}$	52.04
July	$51\frac{5}{8}$	52	51.83
August	$51\frac{7}{8}$	$52\frac{1}{16}$	51.98
September	$51\frac{3}{4}$	$52\frac{1}{16}$	51.91
October	$51\frac{9}{16}$	$51\frac{15}{16}$	51.78
November	$50\frac{7}{8}$	$51\frac{3}{4}$	51.35
December	50	51	50.44

USE OF THE PRECIOUS METALS IN THE ARTS AND MANUFACTURES.

OFFICE OF SUPERINTENDENT OF
UNITED STATES ASSAY OFFICE,
New York City, July 25, 1882.

SIR: Deposits of gold and silver bullion for bars which have probably been used in the arts and manufactures during the fiscal year from July 1, 1881, to June 30, 1882, appear as follows, viz:

	Gold.	Silver.
Of United States coin	$45,511 06	$15,867 73
Of foreign coin	532,154 28	154,522 07
Of foreign bullion	843,281 26	192,226 35
Of plate, &c	690,063 81	191,719 33
Of domestic bullion	5,206,075 85	5,444,111 16
Total	7,317,086 26	5,998,446 64

Very respectfully,

PIERRE C. VAN WYCK,
Superintendent.

R. E. PRESTON, Esq.,
Acting Director Mint, Washington, D. C.

UNITED STATES ASSAY OFFICE, NEW YORK CITY,
SUPERINTENDENT'S OFFICE,
January 15, 1883.

SIR: Deposits of gold and silver bullion for bars which have probably been used in the arts and manufactures during the calendar year 1882 appear as follows, viz:

	Gold.	Silver.
Of domestic bullion	$5,548,037 69	$5,744,250 99
Of foreign bullion	334,712 34	306,863 77
Of United States coin	45,511 06	9,322 46
Of foreign coin	336,711 11	133,403 69
Of jewelers' bars, &c	696,543 27	212,867 78
Total	6,961,515 47	6,406,708 69

Very respectfully,

PIERRE C. VAN WYCK,
Superintendent.

HON. H. C. BURCHARD,
Director of the Mint, Washington, D. C.

Statement of imports and exports of gold and silver during the fiscal year ended June 30, 1882.

[Reported by Chief of Bureau of Statistics.]

IMPORTS.

Ports.	Gold.			Silver.				Total.
	Bullion.	Coin.		Bullion.	Coin.			
		American.	Foreign.		American.		Foreign.	
					Trade dollars.	Other.		
NEW YORK.								
July, 1881	$11, 368	$302, 888	$144, 747	$347	....	$104, 206	$86, 264	$649, 820
August, 1881	1, 246, 422	711, 312	3, 148, 465	900	....	75, 334	89, 500	5, 271, 933
September, 1881	2, 229, 163	187, 764	7, 593, 920	4, 000	....	76, 436	182, 752	10, 274, 035
October, 1881	1, 572, 041	827, 043	4, 441, 300	1, 103	....	66, 652	61, 165	6, 969, 304
November, 1881	29, 218	259, 121	746, 686	5, 816	....	48, 952	260, 442	1, 350, 235
December, 1881	506, 543	199, 933	857, 031	....	....	64, 482	129, 112	1, 757, 101
January, 1882	28, 335	82, 394	130, 205	1, 919	....	48, 016	83, 528	374, 397
February, 1882	19, 222	47, 781	33, 906	4, 195	....	49, 071	71, 287	225, 462
March, 1882	30, 286	30, 523	23, 435	6, 125	....	71, 997	319, 003	481, 369
April, 1882	12, 232	10, 951	9, 222	750	....	46, 089	304, 554	383, 798
May, 1882	34, 902	16, 159	12, 021	450	....	32, 714	151, 493	247, 739
June, 1882	44, 293	12, 645	12, 257	7, 851	....	64, 361	88, 406	229, 813
Total	5, 764, 025	2, 688, 514	17, 153, 195	33, 456	....	748, 310	1, 827, 506	28, 215, 006
SAN FRANCISCO.								
July, 1881	189, 735	6, 913	64, 256	183, 406	....	10, 697	196, 110	651, 117
August, 1881	235, 548	....	22, 460	....	....	3, 300	318, 359	579, 667
September, 1881	107, 938	....	67, 738	205, 833	....	5, 109	166, 968	553, 586
October, 1881	931, 030	5, 840	276, 533	115, 129	....	600	117, 333	1, 446, 465
November, 1881	848, 935	....	1, 154, 575	126, 345	....	3, 842	180, 708	2, 314, 405
December, 1881	475, 571	1, 482	661, 142	191, 486	....	2, 371	223, 579	1, 555, 631
January, 1882	395, 313	15, 870	206, 968	50, 728	....	545	249, 068	918, 492
February, 1882	123, 085	795	126, 552	227, 773	....	250	157, 954	636, 409
March, 1882	5, 663	22, 754	19, 579	48, 851	....	4, 185	121, 911	222, 943
April, 1882	168, 508	....	17, 299	312, 730	....	12, 378	265, 433	776, 348
May, 1882	66, 343	7, 794	24, 485	180, 668	....	200	186, 506	465, 996
June, 1882	49, 442	13, 469	76, 329	245, 295	....	....	137, 167	521, 702
Total	3, 597, 111	74, 917	2, 717, 916	1, 888, 244	....	43, 477	2, 321, 096	10, 642, 761
ALL OTHER PORTS.								
July, 1881	1, 511	247	29, 187	24, 144	....	9, 344	55, 934	120, 367
August, 1881	2, 521	9, 727	50, 741	23, 586	....	14, 307	57, 473	158, 355
September, 1881	125	447, 400	26, 593	2, 160	....	14, 100	76, 369	566, 747
October, 1881	4, 523	215, 500	21, 680	5, 669	....	32, 050	33, 210	312, 632
November, 1881	....	4, 489	16, 178	1, 407	....	5, 235	22, 405	49, 714
December, 1881	6, 390	7, 076	13, 005	25, 740	....	29, 602	85, 122	166, 935
January, 1882	1, 652	248, 078	25, 225	10, 800	....	9, 917	79, 819	375, 491
February, 1882	4, 131	59, 066	54, 287	2, 200	....	2, 608	115, 308	237, 600
March, 1882	526	705, 700	1, 100	10, 689	....	7, 706	30, 287	756, 008
April, 1882	4, 805	320, 595	7, 689	49, 560	....	3, 626	59, 784	446, 059
May, 1882	4, 100	14, 626	24, 196	7, 797	....	3, 007	48, 681	102, 407
June, 1882	14, 633	695	33, 379	36, 281	....	17, 588	219, 732	322, 308
Total	44, 917	2, 033, 199	303, 260	200, 033	....	149, 090	884, 124	3, 614, 623
Total imports	9, 406, 053	4, 796, 630	20, 174, 371	2, 121, 733	....	940, 877	5, 032, 726	42, 472, 390

Statement of imports and exports, &c.—Continued.

EXPORTS (DOMESTIC).

Ports.	Gold.		Silver.			Total.
	Bullion.	Coin.	Bullion.	Coin.		
				Trade dollars.	Other.	
NEW YORK.						
July, 1881	....	$32, 617	$901, 600	....	....	$934, 217
August, 1881	....	85, 590	667, 000	....	....	752, 590
September, 1881	$10, 000	50, 216	648, 600	....	$27, 900	736, 716
October, 1881	63, 000	39, 970	832, 800	....	3, 000	938, 770
November, 1881	....	20, 133	859, 400	....	8, 650	888, 183
December, 1881	....	29, 104	885, 200	....	1, 860	916, 164
January, 1882	....	8, 500	1, 088, 237	....	3, 000	1, 099, 737
February, 1882	27, 500	6, 695, 498	695, 000	....	146, 000	7, 563, 998
March, 1882	....	3, 070, 900	803, 700	....	1, 920	3, 876, 520
April, 1882	....	1, 125, 500	598. 600	....	....	1, 724, 100
May, 1882	....	12, 911, 200	630, 889	....	140, 000	13, 682, 089
June, 1882	1, 456, 925	3, 249, 794	572, 300	....	3, 502	5, 282, 521
Total	1, 557, 425	27, 319, 022	9, 183, 326	....	335, 832	38, 395, 605
SAN FRANCISCO.						
July, 1881	1, 904	50, 010	339, 827	....	23, 100	414, 841
August, 1881	3, 551	28, 360	49, 484	....	1, 500	82, 895
September, 1881	13, 100	32, 596	....	....	....	45, 696
October, 1881	3, 540	56, 631	50, 989	....	3, 400	114, 560
November, 1881	7, 980	67, 783	56, 987	....	2, 945	135, 695
December, 1881	4, 125	69. 370	....	....	2, 150	75, 645
January, 1882	100	77, 710	535, 728	....	100	613, 638
February, 1882	50	1, 745	456, 869	....	....	458, 664
March, 1882	250	28, 135	125, 500	....	2, 135	156, 020
April, 1882	3, 460	41, 297	247, 602	....	....	292, 359
May, 1882	....	48, 444	449, 521	....	....	497, 965
June, 1882	600	49, 843	146, 094	....	1, 000	197, 537
Total	38, 660	551, 924	2, 458, 601	....	36, 330	3, 085, 515
ALL OTHER PORTS.						
July, 1881	....	9, 100	4, 146	....	1, 462	14, 708
August, 1881	416	19, 015	....	....	3, 115	22, 546
September, 1881	....	16, 704	....	....	4, 900	21, 604
October, 1881	....	....	660	....	....	660
November, 1881	500	....	2, 478	....	....	2, 978
December, 1881	....	....	....	....	900	900
January, 1882	....	4, 524	....	$3, 600	18, 429	26, 553
February, 1882	....	....	1, 011	....	4, 269	5, 280
March, 1882	255	....	....	....	5, 465	5, 720
April, 1882	1, 080	820, 000	....	....	5, 947	827, 027
May, 1882	....	300, 000	....	....	2, 850	302, 850
June, 1882	....	765, 000	3, 325	....	....	768, 325
Total	2, 251	1, 934, 343	11, 620	3, 600	47, 337	1, 999, 151
Total domestic exports	1, 598, 336	29, 805, 289	11, 653, 547	3, 600	419, 499	43, 480, 271

Statement of imports and exports, &c.—Continued.

EXPORTS (FOREIGN).

Ports.	Gold.		Silver.		Total.
	Bullion.	Coin.	Bullion.	Coin.	
NEW YORK.					
July, 1881	....	$16, 830	....	$94, 420	$111, 250
August, 1881	....	41, 716	....	173, 433	215, 149
September, 1881	....	25, 550	....	211. 226	236, 776
October, 1881	....	13, 800	$21, 642	197, 050	232, 492
November, 1881	....	728	....	117, 418	118, 146
December, 1881	....	5, 485	26, 042	157, 069	188, 596
January, 1882	....	9, 731	....	160, 973	170, 704
February, 1882	$2, 100	504, 500	8, 000	171, 563	686, 163
March, 1882	....	129, 300	3, 668	332, 710	465, 678
April, 1882	....	344, 812	....	114, 171	458, 983
May, 1882	....	29, 760	....	318, 516	348, 276
June, 1882	....	50, 089	19, 441	459, 445	528, 97
Total	2, 100	1, 172, 301	78, 793	2, 507, 994	3, 761, 188
SAN FRANCISCO.					
July, 1881	....	1, 900	....	121, 610	123, 510
August, 1881	....	....	....	138, 966	138, 966
September, 1881	....	....	....	154, 011	154, 011
October, 1881	....	....	....	278, 906	278, 906
November, 1881	....	....	....	150, 305	150, 305
December, 1881	....	....	....	173, 318	173, 318
January, 1882	....	1, 654	....	370, 144	371, 798
February, 1882	....	....	....	69, 417	69, 417
March, 1882	....	....	....	251, 884	251, 884
April, 1882	....	6, 300	....	92, 964	99, 264
May, 1882	....	....	....	230, 863	230, 863
June, 1882	....	....	....	114, 518	114, 518
Total	....	9, 854	....	2, 146, 906	2, 156, 760
ALL OTHER PORTS.					
July, 1881	....	....	....	....	....
August, 1881	....	....	....	1, 700	1, 700
September, 1881	....	....	....	....	....
October, 1881	....	....	....	....	....
November, 1881	....	....	....	....	....
December, 1881	....	....	....	8, 762	8, 762
January, 1882	....	....	....	1, 400	1, 400
February, 1882	....	....	....	....	....
March, 1882	....	....	....	....	....
April, 1882	....	....	....	....	....
May, 1882	....	....	....	121	121
June, 1882	....	....	....	7, 277	7, 277
Total	....	....	....	19, 260	19, 260
Total foreign exports	2, 100	1, 182, 155	78, 793	4, 674, 160	5, 937, 208

Statement of imports and exports of gold and silver during the calendar year ended December 31, 1882.

[Reported by Chief of Bureau of Statistics.]

IMPORTS.

Ports.	Gold.			Silver.				Total.
	Bullion.	Coin.		Bullion.	Coin.			
		American.	Foreign.		American.		Foreign.	
					Trade dollars.	Other.		
NEW YORK.								
January, 1882	$28, 335	$82, 394	$130, 205	$1, 919	....	$48, 016	$83, 528	$374, 397
February, 1882	19, 222	47, 781	33, 906	4, 195	....	49, 071	71, 287	225, 462
March, 1882	30, 286	30, 523	23, 435	6, 125	....	71, 997	319, 003	481, 369
April, 1882	12, 232	10, 951	9, 222	750	....	46, 089	304, 554	383, 798
May, 1882	34, 902	16, 159	12, 021	450	....	32, 714	151, 493	247, 739
June, 1882	44, 293	12, 645	12, 257	7, 851	....	64, 361	88, 406	229, 813
July, 1882	17, 610	20, 512	14, 828	....	....	48, 460	61, 340	162, 780
August, 1882	21, 377	29, 457	19, 416	617	....	48, 304	349, 880	469, 051
September, 1882	14, 196	351, 161	17, 229	....	....	22, 317	113, 538	518, 441
October, 1882	8, 416	1, 065, 558	192, 762	737	....	26, 377	129, 095	1, 422, 945
November, 1882	10, 780	427, 188	611, 372	....	....	45, 917	613, 131	1, 708, 388
December, 1882	199, 258	155, 345	696, 529	1, 530	....	26, 709	392, 947	1, 472, 318
Total	440, 907	2, 249, 704	1, 773, 182	24, 174	....	530, 332	2, 678, 202	7, 696, 501
SAN FRANCISCO.								
January, 1882	395, 313	15, 870	206, 968	50, 728	....	545	249, 068	918, 492
February, 1882	123, 085	795	126, 552	227, 773	....	250	157, 954	636, 409
March, 1882	5, 663	22, 754	19, 579	48, 851	....	4, 185	121, 911	222, 943
April, 1882	168, 508	....	17, 299	312, 730	....	12, 378	265, 433	776, 348
May, 1882	66, 343	7, 794	24, 485	180, 668	....	200	186, 506	465, 996
June, 1882	49, 442	13, 469	76, 329	245, 295	....	....	137, 167	521, 702
July, 1882	25, 120	12, 187	46, 181	158, 351	....	4, 720	112, 073	358, 632
August, 1882	323, 092	3, 308	15, 610	132, 227	....	2, 174	132, 239	608, 650
September, 1882	299, 349	41, 210	303, 031	151, 655	....	698	36, 092	832, 035
October, 1882	678, 025	1, 638	312, 853	....	....	2, 638	61, 340	1, 056, 494
November, 1882	381, 431	1, 058	721, 302	217, 212	....	2, 800	376, 107	1, 699, 910
December, 1882	252, 569	1, 922	118, 691	171, 360	....	575	229, 240	774, 357
Total	2, 767, 940	122, 005	1, 988, 880	1, 896, 850	....	31, 163	2, 065, 130	8, 871, 968
ALL OTHER PORTS.								
January, 1882	1, 652	248, 078	25, 225	10, 800	....	9, 917	79, 819	375, 491
February, 1882	4, 131	59, 066	54, 287	2, 200	....	2, 608	115, 308	237, 600
March, 1882	526	705, 700	1, 100	10, 689	....	7, 706	30, 287	756, 008
April, 1882	4, 805	320, 595	7, 689	49, 560	....	3, 626	59, 784	446, 059
May, 1882	4, 100	14, 626	24, 196	7, 797	....	3, 007	48, 681	102, 407
June, 1882	14, 633	695	33, 379	36, 281	....	17, 588	219, 732	322, 308
July, 1882	7, 059	6, 766	11, 909	....	....	....	35, 026	69, 760
August, 1882	4, 000	....	8, 618	10, 126	....	11, 208	35, 679	69, 641
September, 1882	3, 680	100, 200	5, 743	85, 188	....	....	102, 747	297, 558
October, 1882	11, 456	1, 562, 000	2, 702	29, 186	....	6, 479	20, 491	1, 632, 314
November, 1882	1, 475	76, 100	11, 081	72, 736	....	2, 703	396, 865	560, 960
December, 1882	4, 197	714, 186	4, 255	90, 141	....	3, 531	255, 028	1, 071, 338
Total	61, 714	3, 808, 012	190, 184	404, 704	....	68, 383	1, 399, 447	5, 932, 444
Total imports	3, 270, 561	6, 179, 721	3, 952, 246	2, 325, 728	....	629, 878	6, 142, 779	22, 500, 913

Statement of imports and exports of gold and silver, &c.—Continued.

EXPORTS (DOMESTIC).

Ports.	Gold.		Silver.			Total.
	Bullion.	Coin.	Bullion.	Coin.		
				Trade dollars.	Other.	
NEW YORK.						
January, 1882	....	$8, 500	$1, 088, 237	....	$3, 000	$1, 099, 737
February, 1882	$27, 500	6, 695, 498	695, 000	....	146, 000	7, 563, 998
March, 1882	....	3, 070, 900	803, 700	....	1, 920	3, 876, 520
April, 1882	....	1, 125, 500	598, 600	....	....	1, 724, 100
May, 1882	....	12, 911, 200	630, 889	....	140, 000	13, 682, 089
June, 1882	1, 456, 925	3, 249, 794	572, 300	....	3, 502	5, 282, 521
July, 1882	3, 080, 745	1, 374, 400	995, 050	....	9	5, 450, 204
August, 1882	1, 004, 183	523, 051	670, 600	....	13, 930	2, 211, 764
September, 1882	....	146, 005	602, 200	....	8, 879	757, 084
October, 1882	....	21, 620	156, 700	....	....	178, 320
November, 1882	....	5, 600	405, 400	....	23, 000	434, 000
December, 1882	....	106, 785	936, 223	....	14, 230	1, 057, 238
Total	5, 569, 353	29, 238, 853	8, 154, 899	....	354, 470	43, 317, 575
SAN FRANCISCO.						
January, 1882	100	77, 710	535, 728	....	100	613, 638
February, 1882	50	1, 745	456, 869	....	....	458, 664
March, 1882	250	28, 135	125, 500	....	2, 135	156, 020
April, 1882	3, 460	41, 297	247, 602	....	....	292, 359
May, 1882	....	48, 444	449, 521	....	....	497, 965
June, 1882	600	49, 843	146, 094	....	1, 000	197, 537
July, 1882	....	53, 945	340, 501	....	....	394, 446
August, 1882	6, 578	64, 440	347, 306	....	....	418, 324
September, 1882	500	58, 900	273, 971	....	1, 300	334, 671
October, 1882	4, 290	78, 206	97, 411	....	1, 100	181, 007
November, 1882	2, 120	42, 505	....	....	....	44, 625
December, 1882	5, 736	62, 678	72, 064	....	400	140, 878
Total	23, 684	607, 848	3, 092, 567	....	6, 035	3, 730, 134
ALL OTHER PORTS.						
January, 1882	....	4, 524	....	$3, 600	18, 429	26, 553
February, 1882	....	....	1, 011	....	4, 269	5, 280
March, 1882	255	....	....	....	5, 465	5, 720
April, 1882	1, 080	820, 000	....	....	5. 947	827, 027
May, 1882	....	300, 000	....	....	2, 850	302, 850
June, 1882	....	765, 000	3, 325	....	....	768, 325
July, 1882	....	240, 000	....	....	....	240, 000
August, 1882	....	....	....	1, 000	....	1, 000
September, 1882	....	....	....	....	800	800
October, 1882	....	....	1, 315	....	1, 500	2, 815
November, 1882	....	....	1, 815	....	....	1, 815
December, 1882	....	....	....	....	650	650
Total	1, 335	2, 129, 524	7, 466	4, 600	39, 910	2, 182, 835
Total domestic exports	5, 594, 372	31, 976, 225	11, 254, 932	4, 600	400, 415	49, 230, 544

Statement of imports and exports of gold and silver, &c.—Continued.

EXPORTS (FOREIGN).

Ports.	Gold.		Silver.		Total.
	Bullion.	Coin.	Bullion.	Coin.	
NEW YORK.					
January, 1882	....	$9, 731	....	$160, 973	$170, 704
February, 1882	$2, 100	504, 500	$8, 000	171, 563	686, 163
March, 1882	....	129, 300	3, 668	332, 710	465, 678
April, 1882	....	344, 812	....	114, 171	458, 983
May, 1882	....	29, 760	....	318, 516	348, 276
June, 1882	....	50, 089	19, 441	459, 445	528, 975
July, 1882	....	5, 332	....	184, 500	189, 832
August, 1882	....	38, 960	110, 000	345, 061	494, 021
September, 1882	....	24, 444	....	197, 434	221, 878
October, 1882	....	500	....	154, 776	155, 276
November, 1882	....	2, 500	15, 000	285, 998	303, 498
December, 1882	....	500	55, 000	436, 098	491, 598
Total	2, 100	1, 140, 428	211, 109	3, 161, 245	4, 514, 882
SAN FRANCISCO.					
January, 1882	....	1, 654	....	370, 144	371, 798
February, 1882	....	....	....	69, 417	69, 417
March, 1882	....	....	....	251, 884	251, 884
April, 1882	....	6, 300	....	92, 964	99, 264
May, 1882	....	....	....	230, 863	230, 863
June, 1882	....	....	....	114, 518	114, 518
July, 1882	....	....	....	135, 921	135, 921
August, 1882	....	....	....	169, 437	169, 437
September, 1882	....	....	....	103, 876	103, 876
October, 1882	....	....	....	195, 125	195, 125
November, 1882	....	....	....	192, 878	192, 878
December, 1882	....	....	....	347, 281	347, 281
Total	....	7, 954	....	2, 274, 308	2, 282, 262
ALL OTHER PORTS.					
January, 1882	....	....	....	1, 400	1, 400
February, 1882	....	....	....	....	....
March, 1882	....	....	....	....	....
April, 1882	....	....	....	....	....
May, 1882	....	....	....	121	121
June, 1882	....	....	....	7, 277	7, 277
July, 1882	....	....	....	....	....
August, 1882	....	....	....	....	....
September, 1882	....	....	....	....	....
October, 1882	....	....	....	....	....
November, 1882	....	....	....	1, 648	1, 648
December, 1882	....	....	....	....	....
Total	....	....	....	10, 446	10, 446
Total foreign exports	2, 100	1, 148, 382	211, 109	5, 445, 999	6, 807, 590

Statement of imports and exports of gold and silver coin and bullion for the calendar year ended December 31, 1882.

IMPORTS.

	Gold.	Silver.	Total.
Bullion	$3, 270, 561	$2, 325, 728	$5, 596, 289
Foreign coin	3, 952, 246	6, 142, 779	10, 095, 025
Total	7, 222, 807	8, 468, 507	15, 691, 314
American coin	6, 179, 721	629, 878	6, 809, 599
Total bullion and coin	13, 402, 528	9, 098, 385	22, 500, 913

Statement of imports and exports of gold and silver, &c.—Continued.

EXPORTS.

	Gold.	Silver.	Total.
Domestic bullion	$5, 594, 372	$11, 254, 932	$16, 849, 304
Foreign bullion	2, 100	211, 109	213, 209
Foreign coin	1, 148, 382	5, 445, 999	6, 594, 381
Total	6, 744, 854	16, 912, 040	23, 656, 894
American coin	31, 976, 225	*405, 015	32, 381, 240
Total bullion and coin	38, 721, 079	17, 317, 055	56, 038, 134

* Including 4,600 trade dollars.

EXCESS.

	Gold.	Silver.
Bullion and foreign coin:		
Imports, excess	$477, 953	
Exports, excess		$8, 443, 533
American coin:		
Imports, excess		224, 863
Exports, excess	25, 796, 504	

Imports of gold and silver bullion at San Francisco during calendar year 1882.

Source.	Silver bullion.	Silver coin.	Gold bullion.	Gold coin.	Total.
Central American States		$27, 325	$3, 081	$21, 549	$51, 955
Chili		8, 155			8, 155
China		9, 275			9, 275
French Possessions		84, 009		1, 800	85, 809
British Columbia	$9, 000		560, 660	103, 512	673, 172
British Australia	48, 052		1, 755, 124	1, 330, 931	3, 134, 107
Japan		16, 593	624, 414		641, 007
Mexico	1, 839, 798	1, 850, 986	447, 613	30, 141	4, 168, 538
Total	1, 896, 850	1, 996, 343	3, 390, 892	1, 487, 933	8, 772, 018

Shipments of base bullion containing gold or silver via the Atchison, Topeka and Santa Fé Railroad from January 1 *to June* 30, 1882.

To whom consigned.	Locality from which shipped.			Total.
	Arizona.	Colorado.	New Mexico.	
	Pounds.	*Pounds.*	*Pounds.*	*Pounds.*
Saint Louis Smelting and Refining Company		9, 393, 716		9, 393, 716
Kansas City Smelting and Refining Company		3, 654, 187	100, 000	3, 754, 187
Manhattan Smelting and Refining Company		474, 854		474, 854
E. Balbach & Son		2, 686, 251		2, 686, 251
J. H. Ackerman & Co		2, 238, 173		2, 238, 173
Pope, Cole & Co	198, 984		528, 130	727, 114
Phelps, Dodge & Co			401, 000	401, 000
Omaha National Bank	130, 190			130, 190
Russell Gold and Silver Mining Company	164, 430			164, 430
Tatham Bros	169, 170			169, 170
G. M Ayer & Co	20, 750			20, 750
P. R. Smith	24, 500			24, 500
Oxford Nickel and Copper Company	181, 234		127, 586	308, 820
L. Zeckendorf	40, 000			40, 000
Total	929, 258	18, 447, 181	1, 156, 716	20, 533, 155

Shipments of base bullion containing gold or silver via the Atchison, Topeka and Santa Fé Railroad from July 1 to December 31, 1882.

To whom consigned.	Locality from which shipped.			Total.
	Arizona.	Colorado.	New Mexico.	
	Pounds.	*Pounds.*	*Pounds.*	*Pounds.*
Saint Louis Smelting and Refining Company		8, 654, 506	96, 890	8, 751, 396
Kansas City Smelting and Refining Company		2, 550, 050	949, 950	3, 500, 000
E. Balbach & Son		2, 306, 338		2, 306, 338
J. H. Ackerman & Co		1, 586, 818		1, 586, 818
Pope, Cole & Co	1, 501, 300		1, 254, 250	2, 755, 550
Phelps, Dodge & Co	161, 230		864, 830	1, 026, 060
Omaha National Bank	150, 530			150, 530
Russell Gold and Silver Mining Company	566, 370			566, 370
St. Genevieve Copper Company	296, 180			296, 180
David Meyer	294, 280			294, 280
Oxford Nickel and Copper Company	287, 650			287, 650
Pueblo Smelting and Refining Company			72, 000	72, 000
Emerson Foot			24, 000	24, 000
H. R. Walcott			30, 000	30, 000
L. Zeckendorf	165, 360			165, 360
Total	3, 422, 900	15, 097, 712	3, 291, 920	21, 812, 532

Shipments of base bullion containing gold or silver via the Atchison, Topeka and Santa Fé Railroad during the calendar year 1882.

To whom consigned.	Locality from which shipped.			Total.
	Arizona.	Colorado.	New Mexico.	
	Pounds.	*Pounds.*	*Pounds.*	*Pounds.*
Saint Louis Smelting and Refining Company		18, 048, 222	96, 890	18, 145, 112
Kansas City Smelting and Refining Company		6, 204, 237	1, 049, 950	7, 254, 187
E. Balbach & Son		4, 992, 589		4, 992, 589
J. H. Ackerman & Co		3, 824, 991		3, 824, 991
Pope, Cole & Co	1, 700, 284		1, 782, 380	3, 482, 664
Phelps, Dodge & Co	161, 230		1, 265, 830	1, 427, 060
Omaha National Bank	280, 720			280, 720
Russell Gold and Silver Mining Company	730, 800			730, 800
Tatham Bros	169, 170			169, 170
Saint Genevieve Copper Company	296, 180			296, 180
David Meyer	294, 280			294, 280
Oxford Nickel and Copper Company	468, 884		127, 586	596, 470
Pueblo Smelting and Refining Company			72, 000	72, 000
G. M. Ayer & Co	20, 750			20, 750
P. R. Smith	24, 500			24, 500
Emerson Foot			24, 000	24, 000
H. R. Walcott			30, 000	30, 000
L. Zeckendorf	205, 360			205, 360
Manhattan Smelting and Refining Company		474, 854		474, 854
Total	4, 352, 158	33, 544, 893	4, 448, 636	42, 345, 687

Shipments of ore containing gold or silver via the Atchison, Topeka and Santa Fé Railroad from January 1 to June 30, 1882.

To whom consigned.	Locality from which shipped.		Total.
	Colorado.	New Mexico.	
	Pounds.	*Pounds.*	*Pounds.*
Kansas City Smelting and Refining Company	415, 593		415, 593
E. Balbach & Son, Newark, N. J	596, 701		596, 701
Lone Elm Mining and Smelting Company, Joplin, Mo	20, 000		20, 000
S. C. Stewart, Tyrone Forge, Pa	20, 000		20, 000
E. A. Moffitt, Joplin, Mo	21, 174		21, 174
Pope, Cole & Co., Baltimore		108, 340	108, 340
Socorro Milling Company, Socorro, N. Mex		26, 600	26, 600
Cerillos Mining and Reduction Company, Cerillos, N. Mex		757, 192	757, 192
Pueblo Smelting and Refining Company, Pueblo, Colo		55, 000	55, 000
George B. Macaulay, Denver, Colo		20, 000	20, 000
Total	1, 073, 468	967, 132	2, 040, 600

Shipments of ore containing gold or silver via the Atchison, Topeka and Santa Fé Railroad from July 1 to December 31, 1882.

To whom consigned.	Locality from which shipped.		Total.
	Colorado.	New Mexico.	
	Pounds.	*Pounds.*	*Pounds.*
Saint Louis Smelting and Refining Company	1, 475, 730		1, 475, 730
Illinois Zinc Works, Peru, Ill	1, 101, 050		1, 101, 050
Pope, Cole & Co., Baltimore	20, 000		20, 000
Cerillos Mining and Reduction Company, Cerillos, N. Mex		1, 396, 725	1, 396, 725
Total	2, 596, 780	1, 396, 725	3, 993, 505

Shipments of ore containing gold or silver via the Atchison, Topeka and Santa Fé Railroad during the calendar year 1882.

To whom consigned.	Locality from which shipped.		Total.
	Colorado.	New Mexico.	
	Pounds.	*Pounds.*	*Pounds.*
Kansas City Smelting and Refining Company	415, 593		415, 593
Saint Louis Smelting and Refining Company	1, 475, 730		1, 475, 730
E. Balbach & Son, Newark, N. J	596, 701		596, 701
Illinois Zinc Works, Peru, Ill	1, 101, 050		1, 101, 050
Cerillos Mining and Reduction Company, Cerillos, N. Mex		2, 153, 917	2, 153, 917
Pope, Cole & Co., Baltimore	20, 000	108, 340	128, 340
Socorro Milling Company, Socorro, N. Mex		26, 600	26, 600
Pueblo Smelting and Refining Company, Pueblo, Colo		55, 000	55, 000
Lone Elm Mining and Smelting Company, Joplin, Mo	20, 000		20, 000
S. C. Stewart, Tyrone Forge, Pa	20, 000		20, 000
E. A. Moffitt, Joplin, Mo	21, 174		21, 174
George B. Macaulay, Denver, Colo		20, 000	20, 000
Total	3, 670, 248	2, 363, 857	6, 034, 105

Shipments of ore containing gold or silver via the Union Pacific Railroad from January 1 to June 30, 1882.

To whom consigned.	State or Territory.					Total.
	Colorado.	Idaho.	Montana.	Utah.	Wyoming.	
	Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
Golden Smelting Company, Golden City, Colo	4, 490, 587					4, 490, 587
Boston and Colorado Smelting Works, Argo	11, 791, 199		861, 045			12, 652, 244
Saint Louis Smelting and Refining Company	69, 390					69, 390
Miners' Smelting and Refining Company, Golden City	6, 390, 275					6, 390, 275
La Plata Smelting and Refining Company, Leadville	33, 250					33, 250
R. Koenig, Golden City, Colo	598, 027					598, 027
D. Van Buskirk, Golden City, Colo.	20, 000					20, 000
Valley Smelting Works, Golden City	2, 016, 447					2, 016, 447
Moore Smelting Works, Golden City	1, 508, 223					1, 508, 223
Humphreys, Idaho Springs, Colo	2, 460, 000					2, 460, 000
Denver Smelting and Chemical Works	40, 000					40, 000
Denver Sampling Works	28, 200					28, 200
N. W. Reduction and Chemical Works, Chicago					175, 150	175, 150
A. P. Stephens, Lawson, Colo	3, 348, 710					3, 348, 710
W. R. Rooney & Co , Chicago					46, 150	46, 150
Woodhaud Bros., Denver	3, 900					3, 900
Horn Silver Company, Franeklyn, Utah					2, 159, 450	2, 159, 450
Omaha Smelting and Refining Company	4, 688, 389			483, 583		5, 171, 972
New England Smelting Company, Boston				21, 550		21, 550
Alma Smelting Company, Fair Play, Colo	122, 940					122, 940
Revere Copper Company, Boston				20, 000		20, 000
J. H. Boyd, Boulder, Colo	406, 000					406, 000
Wm. Jennings, Salt Lake City				2, 613, 570		2, 613, 570
F. W. Ingersol, Argo, Colo	2. 800					2, 800
Conkling Sampling Works, Salt Lake City				1, 099, 105		1, 099, 105
W. A. Isle Works, Silver Cliff	12, 000					12, 000
J. R Nichols, Salt Lake City				47, 250		47, 250
Pueblo Smelting Works, Colorado	74, 400					74, 400
J. E. Dooley, Salt Lake City				164, 620		164, 620
M Giest, Pueblo, Colo	177, 650					177, 650
J. E. Conkling, Salt Lake City				23, 900		23, 900
S. Rosseur, San Francisco	24, 000					24. 000
Thomas Wallace, Phœnixville, Pa			276, 995			276, 995
Matthews & Co., Denver	16, 800					16, 800
F. Farrell, Phœnixville, Pa			159, 580			159. 580
McLain Mining Company, Denver.	80, 590					80, 590
Bell; Clark, Dodge & Co., New York			26, 825			26, 825
Pliny, Nickerson & Co., Boston	20, 000					20, 000
Donnell, Lawson & Simpson, New York			13, 975			13, 975
P. R. Smith, Golden City	2, 000					2, 000
Levisohn Bros., New York			54, 880			54, 880
J H. Conkling, Salt Lake City		24, 000				24, 000
Clark, Dodge & Co., New York			141, 715			141, 715
McCormick & Co., Salt Lake City		125, 395				125, 395
Layton & Rice, Butte, Mont			24, 000			24, 000
Scott & Anderson, Sandy, Utah			59 650			59, 650
Utah Stamp Works, Salt Lake City			76, 420			76, 420
Wells, Fargo & Co., Salt Lake City			12, 250			12, 250
Colorado and Montana Smelting Company, Butte			14, 600			14, 600
Belle Smelting Company, Butte, Mont			54, 000			54, 000
Valley Smelting Company, Butte, Mont			696, 000			696, 000
Pope, Cole & Co., Baltimore			3, 129, 731			3, 129, 731
Total	38, 425, 777	149, 395	5, 601. 666	4, 473, 578	2, 380, 750	51, 031, 166

Bullion product of understated mines for twelve months ended December 31, 1882.

[From the New York Mining Record.]

Name of mine.	State.	Twelve months.	Total.
Standard	California	$1, 258, 057	
Bodie	do	885, 890	
Syndicate	do	75, 458	
Plumas Eureka	do	425, 721	
Sierra Buttes	do	301, 143	
Bodie Tunnel	do	139, 845	
Idaho	do	354, 890	
New York Hill	do	62, 766	
Noondays	do	231, 000	
Bodie District	do	39, 158	
Green Mountain	do	40, 416	
Derbec	do	23, 262	
Spring Valley	do	131, 166	
North Bloomfield	do	386, 146	
Milton	do	429, 229	
			$4, 784, 147
Bassick	Colorado	186, 948	
Chrysolite	do	294, 741	
Iron Silver	do	1, 105, 504	
Caribou	do	192, 881	
Bobtail	do	126, 124	
Freeland	do	192, 579	
Little Emma	do	26, 942	
Dunderberg	do	70, 000	
Evening Star	do	1, 017, 328	
Little Pittsburg	do	171, 595	
Morning Star	do	642, 625	
Prussian Mining Company	do	200, 000	
United Gregory	do	147, 500	
Catalpa	do	84, 000	
Colorado Central	do	75, 430	
Gunnell	do	110, 682	
Palmetto	do	14, 840	
Ute & Ule	do	109, 485	
			4, 769, 204
Central Arizona	Arizona	250, 000	
Copper Queen	do	817, 546	
Boston Mill	do	15, 000	
Grand Central	do	1, 358, 000	
Tombstone	do	1, 448, 059	
Contention	do	1, 680, 542	
Head Center	do	89, 851	
Vizina	do	164, 000	
McMorris	do	281, 024	
Tip-Top	do	243, 081	
Silver King	do	559, 618	
Ingersoll	do	100, 000	
Girard	do	177, 540	
			7, 184, 261
Northern Belle	Nevada	902, 154	
Indian Queen	do	88, 586	
Belcher	do	141, 704	
Crown Point	do	263, 270	
Kentuck	do	76, 478	
Consolidated Imperial	do	45, 063	
Eureka Consolidated	do	1, 010, 200	
Mount Diablo	do	217, 000	
Navajo	do	344, 140	
Eureka Tunnel	do	75, 000	
Bertrand	do	52, 500	
Dunderberg	do	61, 300	
Excelsior	do	20, 216	
Eureka District	do	65, 000	
Ophir	do	35, 273	
Star	do	281, 292	
Independence	do	7, 400	
Day	do	121, 531	
Bullionville Smelter	do	41, 800	
Richmond, estimated	do	873, 700	
Union Consolidated	do	360, 592	
California	do	64, 506	
Albion	do	106, 900	
Bowman	do	19, 300	
Geddees & Bertrand	do	124, 251	
Garrison	do	70, 000	
Jackson	do	30, 000	
Yellow Jacket	do	8, 126	
Ophir District	do	149, 620	
Eureka District (50 mines)	do	276, 133	
			5, 938, 035

Bullion product of understated mines for twelve months, &c.—Continued.

Name of mine.	State.	Twelve months.	Total.
Ontario	Utah	$2, 395, 269	
Horn Silver	....do	3, 176, 570	
Stormont	....do	202, 697	
Christy	....do	372, 426	
Owyhee District	....do	205, 207	$6, 352, 169
General Custer	Idaho	541, 126	541, 126
Alice, estimated	Montana	900, 000	
Alta-Montana	....do	231, 139	
Lexington	....do	340, 000	
Silver Bow	....do	168, 000	
Gagnon	....do	120, 000	
Vulcan, estimated	....do	415, 000	
Shonbar	....do	72, 000	
Morning Star	....do	90, 000	
Hecla	....do	656, 145	
Moulton	....do	395, 000	
Hope	....do	304, 067	
Boston and Montana	....do	285, 898	
Gregory Consolidated	....do	225, 000	
Montana	....do	1, 458, 000	
Bell	....do	324, 000	
Anaconda	....do	100, 000	
Parrot	....do	1, 576	6, 055, 825
Father de Smet	Dakota	391, 269	
Deadwood-Terra	....do	551, 052	
Homestake	....do	1, 114, 568	2, 056, 889
Jocuistita, estimated	Mexico	600, 000	600, 000
Sie. Grande, estimated	New Mexico	1, 185, 452	1, 185, 452
Grand total			39, 467, 108

Assessments on mining shares made during the calendar year 1882.

Name of company.	Number of assessments.	Total amount of levy.
Arizona:		
Head Center	1	$20,000
San Pedro	4	120,000
Tombstone Consolidated	1	100,000
Total	6	240,000
California:		
Bechtel Consolidated	2	35,000
Bodie Consolidated	1	50,000
Belvidere	1	15,000
Boston Consolidated	2	45,000
Champion	3	60,000
Consolidated Pacific	2	27,000
Excelsior	1	100,000
Goodshaw	4	40,000
Mono	5	65,000
Mariposa	1	37,500
May Bell	1	10,000
Maryland	1	12,000
North Standard	1	10,000
Noonday	2	30,000
North Noonday	2	50,000
Spaulding	2	35,000
South Bodie	1	15,000
Tioga Consolidated	3	30,000
University	2	35,000
Washington	1	350,000
Total	38	1,051,500
Colorado:		
Little Chief	2	1,020,000
Dakota:		
Battle Creek Hydraulic	1	20,000
Nevada:		
Alta	2	100,800
Alpha	2	30,000
Andes	3	75,000
Argenta	4	75,000
Best and Belcher	4	200,000
Bullion	5	185,000
Belcher	3	104,000
Belmont	4	27,500
Nevada—Continued:		
Belle Isle	1	$10,000
Caledonia	1	25,000
Consolidated Imperial	1	50,000
Chollar	4	140,000
California	5	486,000
Crown Point	1	25,000
Day	2	80,000
Exchequer	1	25,000
Fairfax	1	25,000
Gould & Curry	3	162,000
Grand Prize	4	80,000
General Lee	1	1,000
Hale & Norcross	4	280,000
Independence	1	15,000
Julia Consolidated	1	22,000
Justice	2	42,000
Kentuck	1	9,000
Leviathan	1	25,000
Martin White	3	75,000
Mexican	4	378,000
Navajo	2	35,000
New York	3	40,000
Niagara	1	12,000
North Belle Isle	2	30,000
Overman	2	86,400
Ophir	2	201,600
Potosi	3	112,000
Prospect	1	10,000
Phil Sheridan	1	5,000
Real Del Monte	1	10,000
Segregated Belcher	2	12,800
Sierra Nevada	4	400,000
Savage	6	308,000
South Hite	2	20,000
Star	4	40,000
Trojan	1	5,000
Utah	5	92,000
Union Consolidated	2	200,000
Virginia Consolidated	2	324,000
Yellow Jacket	1	120,000
Silver Hill Quartz	1	27,000
Total	117	4,843,100
Utah:		
Leeds	2	48,000

Table showing the extent of veins owned severally by a number of the prominent mining companies of Nevada, together with the number of shares, par value, amount of capital stock, and aggregate of assessments and dividends of each company.

[From the New York Mining Record.]

Name of company.	Location of mine.	Linear feet in mine.	Shares.	Par value.	Capital.	Last assessment levied.	Number of assessments.	Total amount of assessment levied.	Last dividend.	Number of dividends.	Total amount of dividends disbursed.
Albion Consolidated Mining Company	Eureka district	6, 000	150, 000	$100	$15, 000, 000	June 26, 1882	11	$315, 000			None.
Alexander Mining Company	Grantsville, Nye County	4, 500	50, 000	100	5, 000, 000	Oct. 31, 1881	1	150, 000	Jan. 1, 1882	1	$100, 000
Alpha Consolidated Gold and Silver Mining Company.	Gold Hill district, Comstock lode	306	30, 000	100	3, 000, 000	Mar. 20, 1882	16	420, 000			None.
Alta Silver Mining Company	do	600	108, 000	100	10, 800, 000	May 2, 1882	23	1, 564, 600			Do.
American Flag Mining Company	Ely district, Lincoln County	2. 000	40, 000	100	4, 000, 000	June 28, 1877	10	280, 000			Do.
Andes Silver Mining Company	Virginia district, Comstock lode	2, 000	100, 000	100	10, 000, 000	Oct. 13, 1882	20	637, 500			Do.
Argenta Mining Company	Tuscarora, Elko County	1, 500	100, 000	100	10, 000, 000	Nov. 9, 1882	13	235, 000	Feb. 26, 1880	2	40, 000
Baltimore Consolidated	Gold Hill district, Comstock lode	1, 050	84, 000	100	8, 400, 000	Apr. 30, 1879	19	1, 037, 600			None.
Belcher Silver Mining Company	do	1, 040	104, 000	100	10, 400, 000	Aug. 15, 1882	31	2, 604, 400	Apr. 10, 1876	38	15, 397, 200
Belle Isle Mining Company	Tuscarora district, Elko County	1, 500	100, 000	100	10, 000, 000	May 23, 1882	4	65, 000	Dec. 5, 1879	6	300, 000
Belmont (Monitor) Mining Company	Philadelphia, Nye County	3, 500	50, 000	100	5, 000, 000	Oct. 31, 1882	34	772, 500			None.
Best & Belcher Mining Company	Virginia district, Comstock lode	540	100, 000	100	10, 000, 000	Nov. 18, 1882	25	1, 343, 390			Do.
Bristol Silver Mining Company			7, 006	25	200, 000	non-assess'ble	..		Feb. 1, 1882	1	14, 012
Buckeye	Devil's Gate, Lyon County	3, 000	48, 000	100	4, 800, 000	Nov. 25, 1878	19	332, 000			None.
Bullion Mining Company	Gold Hill district, Comstock lode	943	100, 000	100	10, 000, 000	Oct. 20, 1882	70	4, 405, 000			Do.
Cabinet Mining Company	do					Oct. 8, 1877		4, 000			Do.
Caledonia Silver Mining Company	do	2, 188	100, 000	100	10, 000, 000	Dec. 6, 1881	38	2, 710, 000			Do.
California Mining Company	Virginia district, Comstock lode	600	540, 000	100	54, 000, 000	Nov. 21, 1882	6	702, 000	Dec. 22, 1879	34	31, 510, 000
Cherry Creek	Cherry Creek, White Pine County	1, 000	30, 000	100	3, 000, 000	Jan. 10, 1877	8	63, 000			None.
*Chollar Mining Company	Virginia district, Comstock lode	700	112, 000	100	11, 200, 000	Sept. 20, 1882	10	465, 000	Feb. 10, 1872	44	3, 080. 000
Combination Mining Company	Black Mountain, Esmeralda County					May 18, 1878	2	20, 000			None.
Consolidated Imperial Mining Company	Virginia district, Comstock lode	468	500, 000	100	50, 000, 000	Jan. 4, 1882	17	1, 377, 000			Do.
Consolidated Virginia Mining Company	Gold Hill district, Comstock lode	710	540, 000	100	54, 000, 000	Aug. 10, 1882	18	897, 200	Aug. 16, 1880	53	42, 930, 000
Confidence Silver Mining Company	do	130	24, 960	100	2, 496, 000	Feb. 12, 1881	12	268, 800	May 1, 1865	6	78, 000
Cosmopolitan Mining Company	do	1, 800	100, 000	100	10, 000, 000	Oct. 11, 1877	5	125, 000	None		None.
Crown Point Gold and Silver Mining Company.	do	600	100, 000	100	10, 000, 000	Feb. 16, 1882	47	2, 673, 370	Jan. 12, 1875	50	11, 683, 000
Day Silver Mining Company	Jack Rabbit district, Lincoln County		100, 000	100	10, 000, 000	Nov. 10, 1882	11	210 000			None.
Dayton Gold and Silver Mining Company	Devil's Gate, Lyon County	1, 600	100, 000	100	10, 000, 000	Apr. 2, 1878	10	750, 000			Do.
De Frees Mill and Mining Company	Tuscarora, Elko County	1, 500	50, 000	100	5, 000, 000	July 21, 1880	11	162, 500			Do.
Eberhardt & Aurora	White Pine County		23, 500	50	1, 175, 000				Dec. —, 1877		174, 500
El Dorado South Consolidated	Philadelphia district, Nye County	2, 600	40, 000	100	4, 000, 000	July 27, 1878	13	567, 000			None.
Eureka Consolidated Mining Company	Ruby Hill, Eureka County	1, 680	50, 000	100	5, 000, 000	May 26, 1876	2	100, 000	July 27, 1882	75	4, 887, 500
Exchequer Gold and Silver Mining Company.	Comstock lode	400	100, 000	100	10, 000, 000	Jan. 12, 1882	18	680, 000			None.

Fairfax Mining Company	......do	800	100,000	100	10,000,000	July 19, 1882	3	40,000			Do.
Florida	American Flat	1,200	50,000	100	5,000,000	Feb. 14, 1877	8	225,000			Do.
General Lee	White Pine County	1,000	10,000	100	1,000,000	Oct. 23, 1882	6	307,100			Do.
General Thomas	Columbus, Esmeralda County	2,100	50,000	100	5,000,000	July 20, 1880	6	125,000			Do.
Geneva Consolidated Silver Mining Company.	Cherry Creek, White Pine County	3,000	50,000	100	5,000,000	Mar. 6, 1876	7	82,500			Do.
Gila	Reveille, Nye County	1,500	100,000	100	10,000,000	July 22, 1881	8	195,000	Aug. 16, 1875	2	50,000
Glasgow Gold and Silver Mining Company.	Devil's Gate, Lyon County	1,500	90,000	100	9,000,000	Feb. 11, 1878	5	45,000			None.
Globe Consolidated	Storey County	4,300	38,000	100	3,800,000	Mar. 29, 1879	11	222,300			Do.
Gould & Curry Silver Mining Company	Virginia district, Comstock lode	612	108,000	100	10,800,000	Aug. 24, 1882	43	3,446,000	Oct. 10, 1870	36	3,825,800
Grand Prize	Tuscarora, Elko County	1,500	100,000	100	10,000,000	Nov. 9, 1882	11	420,000	Sept. 16, 1880	6	450,000
Hale & Norcross Silver Mining Company	Virginia district, Comstock lode	400	112,000	100	11,200,000	Aug. 25, 1882	75	4,006,000	Apr. 10, 1871	36	1,598,000
Hamburg Mining Company	Eureka district	2,000	100,000	100	10,000,000	Sept. 19, 1879	7	305,000			None.
Hillside Mining and Milling Company	Bristol, Lincoln County	5,000	100,000	100	10,000,000	July 20, 1881	5	310,000			Do.
Highbridge Silver Mining Company	Philadelphia district, Nye County	6,000	100,000	100	10,000,000	June 23, 1880	1	30,000			Do.
Hornet Mining Company	Tuscarora	1,500	100,000	100	10,000,000	Jan. 30, 1878	3	30,000			Do.
Hussey	Cornucopia, Elko County	4,500	100,000	100	10,000,000	Aug. 25, 1879	9	131,000			Do.
Independence Mining Company	Tuscarora, Elko County	1,500	100,000	100	10,000,000	Feb. 24, 1882	9	190,000	Sept. 22, 1879	9	225,000
Indian Queen Mining and Milling Company.	Oneota, Esmeralda County	1,000	125,000	2	250,000	Feb. 11, 1880	3	12,000	Dec. 20, 1882	31	362,500
Jackson	Eureka		50,000	100	5,000,000	Nov. 23, 1880	13	262,500			None.
Jefferson	Jefferson, Nye County	8,182	50,000	100	5,000,000	Apr. 13, 1877	4	112,000	May 15, 1875		50,000
Julia Consolidated Mining Company	Virginia district, Comstock lode	3,000	110,000	100	11,000,000	Jan. 17, 1882	17	1,457,500			None.
Justice Mining Company	Gold Hill district, Comstock lode	2,100	105,000	100	10,500,000	Oct. 18, 1882	37	3,377,000			Do.*
Kentuck Mining Company	Comstock lode	95	30,000	100	3,000,000	Nov. 23, 1881	17	342,000	Mar. 10, 1870	32	1,252,000
Knickerbocker	American Flat	2,200	100,000	100	10,000,000	Sept. 27, 1877	19	511,000	None		None.
Kossuth Mining Company	Devil's Gate, Lyon County	2,700	108,000	50	5,400,000	Aug. 31, 1877	8	437,400			Do.
Leopard Mining Company	Cornucopia, Elko County	1,500	50,000	100	5,000,000	Apr. 5, 1880	13	247,500	Dec. 11, 1876	6	162,500
Leviathan	Gold Hill district, Comstock lode	2,000	100,000	100	10,000,000	Sept. 29, 1882	13	380,000			None.
Manhattan	Austin, Lander County	129,810	50,000	100	5,000,000	July 16, 1879	3	150,000	Feb. 1, 1877	8	400,000
Mackey Mining Company	Storey County	2,400	100,000	100	10,000,000	Nov. 23, 1880	5	70,000			None.
Meadow Valley	Ely district, Lincoln County		60,000	100	6,000,000	Aug. 1, 1881	16	528,000	June 16, 1873	17	1,260,000
Mexican Gold and Silver Mining Company.	Virginia district, Comstock lode	600	108,000	100	10,800,000	Oct. 11, 1882	21	2,086,000			None.
Martin White Mining Company	Ward district, White Pine County	22,900	100,000	100	10,000,000	Sept. 2, 1882	13	950,000	June 27, 1879	2	60,000
Mint Gold and Silver Mining Company	Virginia district, Comstock lode	6,200	50,000	100	5,000,000	July 28, 1880	24	165,000			
Monitor Belmont	Belmont, Nye County	1,400	30,000	100	3,000,000	Aug. 8, 1877		162,500	Dec. 5, 1873	3	75,000
Mt. Potosi Consolidated	Columbus district		100,000	100	10,000,000	Oct. 20, 1881	8	175,000			None.
Mt. Diablo	Candelaria district	1,400	50,000	100	5,000,000	June 22, 1880	3	137,500			Do.
Navajo Mining Company	Tuscarora, Elko County	1,500	100,000	100	10,000,000	Mar. 7, 1882	10	255,000	Dec. 12, 1882	4	100,000
Newark Gold and Silver Mining Company.	Ely district, Lincoln County	800	32,000	100	3,200,000	Mar. 13, 1878	14	342,000			None.
New York Mining Company	Gold Hill district, Comstock lode	1,000	100,000	100	10,000,000	Nov. 14, 1882	29	990,000			Do.
Niagara Gold and Silver Company	......do	1,500	60,000	100	6,000,000	Apr. 1, 1882	6	117,000			Do.
North Bonanza	Flowery district, Comstock lode		100,000	100	10,000,000	June 30, 1880	6	200,000			Do.
Northern Belle Mining and Milling Company.	Candelaria, Esmeralda County	1,600	50,000	100	5,000,000				Dec. 15, 1882	67	2,412,500
North Belle Isle Mining Company	Tuscarora district		100,000	100	10,000,000	Nov. 29, 1882	5	75,000	Aug. 19, 1881	2	30,000
Occidental Mining Company	Comstock lode	1,706	40,000	100	4,000,000	Mar. 9, 1879	6	112,500			
Ophir Silver Mining Company	Virginia district, Comstock lode	675	100,800	100	10,800,000	July 21, 1882	42	3,395,000	Jan. 17, 1880	23	1,596,400

*Is part of the Chollar-Potosi Company that had been previously assessed $1,730,000 and had paid $3,080,000 in forty-four dividends.

Table showing the extent of veins owned severally by a number of the prominent mining companies of Nevada, &c.—Continued.

Name of company.	Location of mine.	Linear feet in mine.	Shares.	Par value.	Capital.	Last assessment levied.	Number of assessments.	Total amount of assessment levied.	Last dividend.	Number of dividends.	Total amount of dividends disbursed.
Original Hidden Treasure	Treasure Hill, White Pine County		$21,333	$100	$2,133,000	Oct. 12, 1874	11	$330,061			$31,999
Overman Gold and Silver Mining Company.	Gold Hill district, Comstock lode	1,200	115,200	100	11,520,000	May 1, 1882	53	3,604,700			None.
Phil. Sheridan	Virginia district, Comstock lode	1,200	100,000	100	10,000,000	Nov. 3, 1882	12	180,000			Do.
Phœnix Silver Mining Company	Eureka district	600	50,000	100	5,000,000	May 9, 1881	23	457,500			Do.
Pioche	Pioche, Lincoln County	1,000	20,000	100	2,000,000	Oct. 5, 1876	14	260,000	Aug. 5, 1872	3	60,000
Potosi Mining Company	Virginia district, Comstock lode	700	112,000	100	11,200,000	Nov. 22, 1882	10	504,000			None.
Prospect Mining Company	Storey County	1,000	100,000	100	10,000,000	Sept. 5, 1882	9	300,000			Do.
Prussian	Jefferson, Nye County	1,000	30,000	100	3,000,000	May 12, 1877		150,000			Do.
Raymond & Ely Mining Company	Meadow Valley, Lincoln	5,000	112,000	100	11,200,000	Aug. 27, 1880	16	955,000	Sept. 10, 1873	23	3,075,000
Real del Monte Mining Company	Esmeralda County	3,000	100,000	100	10,000,000	Nov. 17, 1882	16	515,000			None.
Red Cross Mining Company	Storey County	1,300	100,000	100	10,000,000			None			Do.
Rescue	Prospect Hill, Eureka County	1,500	100,000	10	1,000,000						Do.
Richmond Consolidated	Ruby Hill, Eureka district		54,000	25	1,350,000				Nov. 8, 1882	33	3,772,587
Rock Island Gold and Silver Mining Company.	Gold Hill district, Comstock lode	1,200	100,000	100	10,000,000	Jan. 9, 1878	13	365,000			None.
Santiago Mining Company	Devil's Gate, Lyon	2,000	112,000	100	11,200,000				June 11, 1869		Do.
Savage Gold and Silver Mining Company	Virginia district, Comstock lode	806	112,000	100	11,200,000	Nov. 6, 1882	54	5,484,000	June 11, 1869	52	4,560,000
Segregated Belcher Mining Company	Gold Hill district, Comstock lode	160	6,400	100	640,000	Dec. 5, 1881	20	289,600			None.
Segregated Silver Mining Company	do	160	6,400	100	640,000	Jan. 12, 1876		12,000			Do.
Sierra Nevada Silver Mining Company	Virginia district, Comstock lode	3,600	100,000	100	10,000,000	Dec. 8, 1882	75	5,200,000	Jan. 16, 1871	11	102,500
Silver City Mining Company	Gold Hill district, Comstock lode	3,800	63,100	100	6,310,000	May 2, 1881	2	6,310			None.
Silver Hill Mining Company	do	4,000	108,000	100	10,800,000	Feb. 2, 1882	17	1,809,000			Do.
South Barcelona		1,500	60,000	100	6,000,000	Aug. 15, 1879	5	114,000			Do.
South Comstock Gold and Silver Mining Company.	Gold Hill district, Comstock lode	636	100,100	100	10,000,000	Sept. 9, 1879	6	79,000			Do.
South California Silver Mining Company	do	1,500	50,000	100	5,000,000	Feb. 16, 1877	1	10,000			Do.
Star Mining Company	Cherry Creek, White Pine County	1,500	100,000	100	10,000,000	Sept. 27, 1882	12	220,000			Do.
Starr-Grove Silver Mining Company	Lewis district		200,000	10	2,000,000				June 30, 1881	8	160,000
Succor Mill and Mining Company	Gold Hill district, Comstock lode	3,800	68,400	100	6,840,000	Aug. 30, 1879	24	763,800	Oct. 16, 1871	2	22,800
Trenton Mining Company	Devil's Gate, Lyon	1,200	100,000	100	10,000,000						None.
Trojan Mining Company	Storey County	1,500	100,000	100	10,000,000	Nov. 3, 1882	14	330,000			Do.
Tuscarora Consolidated Mill and Mining Company.	Tuscarora district, Elko County	1,500	100,000	100	10,000,000	Oct. 17, 1881	9	110,000			Do.
Tybo Consolidated	Tybo district, Nye County	6,275	150,000	100	15,000,000			None			Do.
Union Consolidated Silver Mining Company.	Virginia district, Comstock lode	600	100,000	100	10,000,000	Oct. 7, 1882	20	1,460,000			Do
Utah Silver Mining Company	do	1,000	20,000	100	2,000,000	Dec. 7, 1882	42	1,360,000			Do.
Ward Gold and Silver Mining Company	do		110,000	100	11,000,000	Dec. 10, 1879	5	198,000			Do.

Wells-Fargo Mining Company	North Virginia	1,500	108,000	100	10,800,000	May 26, 1880	14	228,600			Do.
West Comstock Gold and Silver Mining Company.	Virginia district, Comstock lode	3,000	100,000	100	10,000,000	Sept. 10, 1876		25,000			Do.
White Cross Mining Company	Storey County	650	100,000	100	10,000,000			None			Do.
Woodville	Gold Hill District, Comstock lode	700	120,000	100	12,000,000	Jan. 23, 1878	6	3,030,000			Do.
Yellow Jacket Silver Mining Company	do	957	120,000	100	12,000,000	Feb. 7, 1882	44	5,358,000	Aug. 10, 1871	25	2,184,000
Young America Mining Company	Tuscarora, Elko County	1,000	30,000	100	3,000,000	June 27, 1878	10	57,000			None.

Table showing the extent of veins owned severally by a number of the prominent mining companies of Arizona, California, Colorado, Idaho, Utah, Michigan, &c., together with the number of shares, par value, amount of capital stock, and aggregate of assessments and dividends of each company.

[From the New York Mining Record.]

Name of company.	State.	Location of mine.	Feet in mine.	Shares.	Par value.	Capital.	Last assessment levied.	Number of assessments.	Total amount of assessment levied.	Last dividend.	Number of dividends.	Total amount of dividends disbursed.
Copper Queen Mining Company	Ariz	Bisbee district		250,000	$10	$2,500,000				Jan. 6, 1883	14	$650,000
Head Centre Mining Company	do	Tombstone		200,000	25	5,000,000	May 25, 1882	3	$160,000			None.
Grand Central Mining Company	do			100,000	10	1,000,000				Dec., 1882	16	800,000
Silver King Mining Company	do	Pioneer district, Pinal County	1,500	100,900	100	10,000,000			no assess.	Jan. 15, 1883	37	1,150,000
Tip Top Silver Company	do	Black Cañon, Yavapai County	1,500	100,000	100	10,000,000	Mar. 9, 1880	4	170,000	Nov. 25, 1881	5	100,000
Tombstone Mill and Mining Company	do	Tombstone district, Pima County.	4,500	500,000	25	12,500,000	not assessable			Apr. 15, 1882	25	1,250,000
Vizina Consolidated Mining Company	do	Tombstone district		200,000	25	5,000,000				Apr. 1, 1882	7	140,000
*Contention Mining Company†	do			250,000	50	12,500,000				Jan. 29, 1883	12	750,000
Addenda Gold and Silver Mining Company.	Cal	Silver Hill, Bodie	1,500	100,000	100	10,000,000	July 11, 1881	5	90,000			None.
Bechtel Consolidated Mining Company	do	Bodie district		100,000	100	10,000,000	Oct. 27, 1882	9	175,000			Do.
Black Bear Quartz Gold Mining and Milling Company.	do	Black Bear Gulch, Siskiyou County.	4,500	30,000	100	3,000,000			15,000	Aug. 18, 1882	80	858,500
Black Hawk Gold Mining Company	do	Bodie district	1,500	50,000	100	5,000,000	Nov. 9, 1881	13	185,000			None.
Bodie Consolidated Gold Mining Company.	do	Bodie	750	100,000	100	10,000,000	Dec. 6, 1881	3	150,000	Nov. 15, 1882	21	1,370,000
Boston Consolidated Mining Company	do			100,000			Oct. 21, 1882	4	95,000			None.
Bulwer Consolidated	do	Bodie	3,000	100,000	100	10,000,000	Dec. 12, 1877	1	30,000	Feb. 12, 1883	15	140,000
Cherokee Gold Mining Company	do	Greenville, Plumas County	2,500	150,000	10	1,500,000						None.
Consolidated Pacific Mining Company	do	Bodie district	1,400	60,000	100	6,000,000	Aug. 19, 1882	5	141,000			47,000
Dudley Gold Mining Company	do	Bodie	1,125	64,000	100	6,400,000	Dec. 7, 1880	11	182,400			None.
Excelsior Water and Mining Company	do	Smartville, Yuba County	521	100,000	100	10,000,000	Jan. 9, 1882	3	150,000	Oct. 6, 1880	31	875,000
Empire Gold Mining Company	do	Grass Valley, Nevada County	3,600	20,000	100	2,000,000	Aug. 5, 1871		40,000	June 15, 1878	16	110,000
Empire Gold Mining Company	do	Plymouth, Amador County	1,900	200,000	10	2,000,000	non-assess'ble			May 5, 1880	11	418,000
Fresno Enterprise Mining Company	do	Fresno County	1,500	100,000	50	5,000,000				July 7, 1882	5	110,000
Goodshaw	do	Bodie district	1,500	100,000	100	10,000,000	Oct. 24, 1882	13	200,000			None.
Gold Stripe Mining Company	do	Greenville		150,000	10	1,500,000				June 30, 1881	4	76,250
Great Western Quicksilver Mining Company.	do	Lake County	3,000	50,000	100	5,000,000	Aug. 25, 1873		35,500	Sept. 4, 1881		250,000
Green Mountain Gold Mining Company	do	Plumas County		125,000	10	1,250,000				Nov. 26, 1881	29	212,375
Hite Gold Quartz Mining Company	do	Hite's Cove, Mariposa County	1,000	200,000	10	2,000,000	not assessable		None			
Idaho Mining Company	do	Grass Valley, Nevada County		3,100	100	310,000	None			Jan. 15, 1883	163	3,341,000
Jupiter Mining Company	do	Bodie district	1,500	64,000			Mar. 19, 1881	12	216,000			None.
Maryland Consolidated Gold Mining Company.	do	do	6,000	120,000	100	12,000,000	Sept. 11, 1882	3	84,000			Do.

McClinton	do	do	1,000	60,000	100	6,000,000	Oct. 2, 1880	7	123,000			Do.
Mono Mining Company	do	do	750	50,000	100	5,000,000	Jan. 4, 1883	20	147,500			Do.
Napa Consolidated Quicksilver Mining Company.	do	Oat Hill district, Napa County	28,500	100,000	100	†69,882.82				Oct. 3, 1882	28	280,000
North Bloomfield Gravel Mining Company.	do	North Bloomfield, Nevada County.	1,800	45,000	100	4,500,000	June 23, 1881	44	1,590,000	Nov. 5, 1880	16	225,000
New York Hill Gold Mining Company	do	Grass Valley, Nevada County		50,000	100	5,000,000	Mar. 26, 1878	6	55,000	Aug. 10, 1882	21	215,000
Noonday	do	Bodie district	1,500	100,000	100	10,000,000	Dec. 2, 1882	7	243,000			None.
North Noonday	do	do	1,500	100,000	100	10,000,000	Dec. 2, 1882	7	252,000			Do.
Plumas Ureka Gold Mining Company	do			40,625		4,062,500				Oct., 1882		1,660,520
Plumas National Quartz Mining Company.	do	Soda Creek, Plumas County		100,000	10	1,000,000	None		None	July 22, 1879	18	141,000
Plumas Mining and Water Company	do	Plumas County		15,000	100	150,000	Oct. 4, 1875		30,000	July 8, 1881		41,300
Red Cloud	do	Bodie district	1,500	50,000	100	5,000,000	Dec. 2, 1882	11	255,000			None.
Rising Sun Gold Mining Company	do			150,000	5	750,000				May 31, 1881	5	51,875
Sierra Buttes Gold Mining Company	do	Sierra Buttes, Sierra Nevada County.		22,500	10	225,000			Paid up.	Oct., 1882		1,459,683
Spaulding Gold and Silver Mining Company.	do	Bodie district	3,000	100,000	100	10,000,000	July 26, 1882	3	35,000			None.
Spring Valley Hydraulic Mining Company.	do			200,000	1	200,000				Jan. 5, 1881		50,000
Standard Consolidated	do	Bodie district		100,000	100	10,000,000	None		None	Jan. 12, 1883	65	4,050,000
Syndicate Mining Company	do	do	1,500	100,000	100	10,000,000	July 19, 1882	4	40,000			None.
Tioga Gold Mining Company	do	do	1,500	100,000	100	10,000,000	Oct. 6, 1882	17	310,000			Do.
University Gold Mining Company	do	do	1,500	100,000	100	10,000,000	Oct. 20, 1882	11	132,500			Do.
Yuba Gold Mining Company	do						Oct. 23, 1882	11		Sept., 1881	2	8,000
Amie Consolidated Mining Company	Colo	Leadville		500,000	10	5,000,000	not assessable			May 17, 1880	6	305,000
Bassick Mining Company	do	Rosita, Custer County		100,000	100	10,000,000				Feb. 18, 1880	1	25,000
Bobtail Gold Mining Company	do	Gilpin County	2,266	227,326	5	1,136,630	not assessable		None	Mar. 30, 1880	4	147,161
Bobtail Tunnel Company	do	do		20,000	5	100,000	July 7, 1873		52,000	Dec. 15, 1879	4	72,000
Breece Mining Company	do	Leadville		200,000	25	5,000,000				Feb. 9, 1880	2	20,000
Buckeye Mining and Tunnel Company	do	Silver Cliff, &c.		400,000	5	2,000,000	not assessable					None.
Caribou Mining Company	do	Boulder County		100,000	10	1,000,000	do			Feb. 20, 1880	6	60,000
Catalpa Mining Company	do	Leadville		300,000	10	3,000,000	do			Dec. 15, 1882	4	210,000
Climax Silver Mining Company	do	do		200,000	10	2,000,000	do			Aug. 20, 1880	5	180,000
Carbonate Hill Mining Company	do			200,000	10	2,000,000	do			Feb. 1, 1883	1	10,000
Chrysolite Mining Company	do	Leadville		200,000	50	10,000,000	do			Dec. 10, 1881	11	1,600,000
Colorado Consolidated Mining Company	do	Georgetown district, Clear Creek County.		65,000	25	1,625,000	do		Paid up.	July, 1875		251,875
Consolidated Hercules and Roe Silver Mining Company.	do	Griffith district, Clear Creek County.	16,500	100,000	10	1,000,000	do		None	Jan., 1876		120,000
Dunderburg Silver Mining Company	do	Georgetown, Clear Creek County.		150,000	10	1,500,000	do					None.
Dunkin Mining Company	do	Leadville		200,000	25	5,000,000	do			June 2, 1881	15	200,212
Evening Star Mining Company	do	do		50,000	10	500,000	do			Oct. 24, 1882	53	1,325,000
Exchange Silver Mining and Milling Company.	do			100,000	10	1,000,000	do			Jan. 20, 1882	6	18,000
Freeland Mining Company	do	Idaho Springs, Clear Creek County.	5,000	200,000	25	5,000,000	do			May 20, 1880		50,000
Glass-Pendery Consolidated Mining Company.	do	Leadville		250,000	20	5,000,000	do			Apr. 8, 1881	1	25,000

*This company, as the Western, up to December 10, 1881, paid $1,475,000.

† Paid-in capital.

Table showing the extent of veins owned severally by a number of the prominent mining companies of Arizona, California, &c.—Continued.

[From the New York Mining Record.]

Name of company.	State.	Location of mine.	Feet in mine.	Shares.	Par value.	Capital.	Last assessment levied.	Number of assessments.	Total amount of assessment levied.	Last dividend.	Number of dividends.	Total amount of dividends disbursed.
Hibernia Mining Company	Colo.	Leadville		300, 000	$25	$7, 500, 000	not assessable			July 2, 1881	6	$180, 000
Highland Chief Consolidated Mining Company.	do	Leadville district		50, 000	50	2, 500, 000	do				21	210, 000
Hukill Gold and Silver Mining Company.	do	S. Bar district, Clear Creek County.	1, 288	100, 000	10	1, 000, 000	do			Dec. 10, 1878		None.
Iron Silver Mining Company	do	Leadville		500, 000	20	10, 000, 000	do			Dec. 26, 1882	9	900, 000
Leadville Consolidated Mining Company.	do	California district, Lake County.	1, 500	400, 000	10	4, 000, 000	do			Jan. 25, 1883	15	310, 000
Little Chief Mining Company	do	Leadville		200, 000	50	10, 000, 000	do			Aug. 7, 1880	7	700, 000
Little Pittsburg Mining Company	do	do		200, 000	100	20, 000, 000	do			Mar. 1, 1880	10	1, 050, 000
La Plata Mining and Smelting Company.	do	do		200, 000	10	2, 000, 000	do			Oct. 4, 1882	35	610, 000
Moose Mining Company	do	Boulder Gulch, Park County	2, 025	200, 000	10	2, 000, 000	do			Mar. 15, 1878	11	550, 000
Morning Star Consolidated Mining Company.	do	Leadville		100, 000	10	1, 000, 000	do			Dec. 27, 1882	15	615, 000
Prussian Mining and Milling Campany	do			150, 000	10	1, 500, 000	do			Jan. 15, 1883	10	132, 000
Robinson Consolidated Mining Company.	do	Leadville		200, 000	50	10, 000, 000	do			Nov. 15, 1881	11	700, 000
Silver King Mining Company	do			500, 000	2	1, 000, 000	do			Aug. 19, 1881	1	50, 000
Barbee & Walker Silver Mining Company.	Utah	Silver Reef		100, 000	10	1, 000, 000	do			Oct. 25, 1880	5	50, 000
Christy Mill and Mining Company	do	do	10, 000	60, 000	100	6, 000, 000	do			Dec. 9, 1882	13	78, 000
Horn Silver Mining Company	do	Frisco, Beaver County	1, 400	400, 000	25	10, 000, 000	do			Jan. 15, 1883	8	2, 000, 000
Leeds	do	Silver Reef	3, 000	60, 000	100	6, 000, 000	June 27, 1882	7	$84, 000	Oct. 10, 1878	7	78, 000
Ontario	do	Uintah, Summit County	3, 000	150, 000	100	15, 000, 000	not assessable			Jan. 15, 1883	87	4, 925, 000
Stormont Silver Mining Company	do	Silver Reef district		200, 000	1	200, 000	do			Nov. 1, 1881	5	155, 000
Ida Elmore	Idaho	Silver City		30, 000			June 26, 1876	22	760, 000	Feb. 8, 1877	13	60, 000
Atlantic Copper Mining Company	Mich	Houghton, Lake Superior	5, 200	40, 000	25	1, 000, 000	Apr. 5, 1875		180, 000	Feb. 1, 1883	4	220, 000
Calumet and Hecla	do	Houghton County, Lake Superior.	1, 300	100, 000	25	2, 500, 000	(4 old companies.)		1, 200, 000	Feb. 15, 1883		22, 850, 000
Central Copper Mining Company	do	Keweenaw County	5, 280	20, 000	25	500, 000	Sept. 10, 1861		100, 000	Feb. 1, 1883	21	1, 670, 000
Copper Falls	do	do		40, 000	50	2, 000, 000	Oct. 4, 1881		620, 000	Aug., 1871	3	100, 000
Franklin Copper Mining Company	do	Lake Superior		40, 000			June, 1877		360, 000			558, 000
Minnesota Copper Mining Company	do	do		20, 000	50	1, 000, 000	June, 1869		436, 000	Mar., 1876		1, 820, 000
National Copper Mining Company	do	Rockland, Ontonagon	1, 600	40, 000	25	1, 000, 000	Oct., 1875		180, 000	Feb., 1872	2	360, 000
Osceola Consolidated Copper Mining Company.	do	Calumet district		50, 000	25	1, 250, 000	Nov. 21, 1879			Jan. 2, 1883	13	860, 000

Quincy Copper Mining Company	do	Portage Lake		40,000	25	1,000,000			200,000	Feb. 21, 1883	29	3,470,000
Silver Islet Consolidated Mining Company.	do	Thunder Bay, Lake Superior.	15,000	40,000	25	1,000,000			None	Jan. 26, 1880	13	None.
Caledonia Gold Mining Company	Dak	Whitewood district	1,500	100,000	100	10,000,000	Aug. 7, 1882	13	480,000			Do.
Deadwood-Terra Gold Mining Company	do	Whitewood (consolidated Dec., 1880).		200,000	25	5,000,000				Jan. 20, 1883	26	*900,000
Father de Smet	do	Whitewood	1,500	100,000	100	10,000,000	Nov. 13, 1878	2	200,000	Jan. 31, 1883	26	620,000
Giant and Old Abe Mining Company	do	do		100,000	100	10,000,000	Sept. 3, 1881	6	300,000			None.
Great Eastern Gold Mining Company	do			300,000	1	300,000				July 15, 1880	4	15,000
Homestake Mining Company	do	Whitewood, Lawrence County, Dakota Territory.	1,500	125,000	100	12,500,000	Apr. 8, 1878	2	200,000	Jan. 25, 1883	53	1,812,500
Dahlonega Gold Mining Company	Ga	Dahlonega district		250,000	1	250,000	not assessable					None.
Findley Gold Mining Company	do	Lumpkin County		200,000	1	200,000	do			May 26, 1879	4	8,000
Consolidated Gold Mining Company	do	Georgia		100,000	5	500,000				Jan. 25, 1883	21	84,000
Granville Gold Mining Company	N. C	Stanly, McDowell County	1,200	300,000	1	300,000	not assessable					None.
Kings Mountain Mining Company	do	Gaston County		120,000	10	1,200,000	do		None			Do.
Ore Knob Copper Company	do	Ashe County	2,600	150,000	10	1,500,000				Oct. 1, 1880	5	210,000
Copper Knob Mining Company	do			1,000,000	1	1,000,000				Nov. 15, 1880	3	15,000
St. Joseph's Lead Mining Company	Mo			100,000	10	1,000,000				Dec. 20, 1882	22	390,375
Alice Gold and Silver Mining Company	Mont	Butte district		400,000	25	10,000,000	not assessable			Dec. 15, 1881	10	400,000
Oregon Hydraulic Gold Mining Company.	Oreg			3,000	20	60,000				Dec. 10, 1881	2	2,250
Boston and Montana Gold Mining Company.	Mont			200,000	10	2,000,000				Jan. 10, 1883	17	310,000
Jocuistita Mining Company	Mex			100,000	100	10,000,000				Nov. 29, 1882	6	750,000
Hecla Consolidated Mining Company	Mont			30,000	50	1,500,000				Jan. 2, 1883	...	372,500

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* The Deadwood, previous to consolidation with the Terra, had paid $275,000 in dividends, while the Terra had paid $75,000.

Highest and lowest quotations and sales of stock of dividend and non-dividend paying mines during the calendar year 1882.

DIVIDEND-PAYING MINES.

Name of mine.	Highest.	Lowest.	Sales.	Dividends paid.
Alice	$3 35	$1 75	48, 425	
Amie Consolidated	43	09	2, 124, 675	
Atlantic	19 00	14 00	250	$80, 000
Argenta	1 00	10	3, 690	
Barbee and Walker	2 00	10	12, 400	
Bassick	6 00	5 00	1, 587	
Belle Isle	70	04	78, 410	
Belcher	1 50	10	256	
Bodie Consolidated	6 25	2 00	48, 079	95, 000
Breece	40	20	11, 200	
Bulwer	2 95	90	51, 048	120, 000
California	68	02	627, 333	
Caribou Consolidated	2 50	80	810	
Catalpa	60	50	700	30, 000
Chrysolite	6 25	96	555, 689	
Climax	45	02	176, 300	
Consolidated Virginia	1 50	28	688, 267	
Crown Point	1 80	1 00	200	
Deadwood-Terra	6 75	4 00	2, 075	205, 000
Dunkin	1 15	20	113, 940	
Eureka Consolidated	24 50	9 13	21, 781	87, 500
Excelsior	2 88	25	7, 440	
Father de Smet	7 00	3 75	4, 235	190, 000
Findley	26	05	16, 900	
Freeland	85	81	200	
Gold Stripe	48	04	83, 200	
Gould and Curry	5 63	2 50	1, 510	
Grand Prize	85	05	21, 510	
Great Eastern	11	01	256, 733	
Green Mountain	2 65	26	248, 885	
Hale and Norcross	3 30	95	1, 630	
Hall-Anderson	25 00	1 05	75, 300	
Hibernia	27	01	470, 400	
Homestake	20 00	14 50	10, 250	562, 500
Horn Silver	17 50	4 60	93, 461	1, 200, 000
Hukill	75	06	74, 340	
Independence	1 60	01	110, 285	
Iron Silver	2 65	1 85	228, 000	400, 000
La Plata	10 00	8 00	255	195, 000
Leadville Consolidated	90	47	79, 148	80, 000
Little Chief	1 25	30	354, 089	
Little Pittsburg	2 55	40	47, 297	
Martin White	7 00	2 10	1, 532	
Moose	2 80	04	343, 196	
Navajo	8 75	12	153, 675	75, 000
Northern Belle	13 75	6 00	25, 671	225, 000
North Belle Isle	50	10	48, 300	
Ontario	40 25	27 00	6, 672	900, 000
Ophir	7 00	1 90	18, 544	
Plumas	25	05	3, 600	
Prussian Mining and Milling Company	5 88	5 25	400	117, 000
Quicksilver, preferred	62 25	40 00	26, 800	280, 313
Quicksilver, common	14 25	8 00	25, 930	
Rising Sun	78	04	215, 270	
Robinson Consolidated	4 10	82	7, 328. 077	
Savage	1 75	78	1, 490	
Sierra Grande	5 13	3 70	167, 150	200, 000
Sierra Nevada	10 00	2 50	57, 452	
Silver King	20 00	10 50	4, 145	300, 000
Spring Valley	4 20	2 25	7, 640	
Standard	20 00	4 00	50, 500	725, 000
Starr-Grove	3 25	30	8, 200	
Stormont	1 60	20	85, 920	
Tip Top	4 50	1 35	2, 750	
Tombstone	4 50	81	5, 600	200, 000
Vizina Consolidated	2 90	1 00	52, 410	100, 000
Yellow Jacket	3 15	70	2,255	

Highest and lowest quotations and sales of stock of dividend and non-dividend paying mines, &c.—Continued.

NON-DIVIDEND-PAYING MINES.

Name of mine.	Highest.	Lowest.	Sales.
Advance Mining and Milling Company	$0 59	$0 21	406, 600
Albion	4 00	1 70	434
Allouez	3 55	2 00	122
Alpha	1 15	1 15	100
Alta	5 63	50	120
Alta Montana	2 00	10	13, 552
American Flag	14	03	7, 500
Bald Mountain	01	....	19, 700
Barcelona	32	05	564, 600
Battle Creek	12	04	6, 000
Bear Creek	75	20	12, 950
Beauce	2 00	1 15	57, 700
Bechtel Consolidated	37	02	7, 400
Belvidere	44	12	7, 500
Best and Belcher	10 50	3 25	38, 000
Big Pittsburg	1 10	10	35, 650
Black Jack	30	....	2, 000
Bonanza Chief	52	02	41, 600
Bondholder	09	04	3, 600
Boston Consolidated	51	01	226, 930
Boulder Consolidated	09	02	85, 880
Bradshaw	68	07	577, 400
Buckeye	08	01	220, 735
Buckeye, preferred	35	19	20, 700
Bull Domingo	46	03	44, 050
Bullion	1 60	85	300
Bye and Bye	13	02	140, 600
Calaveras	15	02	120, 400
Calaveras Mining and Milling Company	60	08	46, 550
Caledonia, B. and H	2 15	20	34, 926
Carbonate Hill	85	20	53, 743
Catskill	10 50	25	1, 000
Central Arizona	1 63	37	150, 242
Chapparal	10	01	1, 080, 400
Cherokee	56	04	206, 455
Cheyenne Consolidated	10	05	1, 500
Chollar	3 25	1 75	400
Clarence	1 60	72	56, 328
Consolidated Imperial	18	01	126, 725
Consolidated Pacific	45	03	15, 125
Consolidated Pay Rock	50	20	2, 272
Crowell	20	04	262, 050
Dahlonega	09	02	49, 900
Decatur	2 50	06	823, 008
Dunderberg	76	10	7, 500
Durango	60	05	704, 000
Eastern Oregon	1 55	1 45	59, 350
Elko Consolidated	10	08	9, 200
Empire	2 00	08	44, 670
Enterprise	1 20	56	406, 300
Globe Copper	70	01	491, 200
Gold Placer	37	14	2, 900
Goodshaw	53	05	60, 000
Granville	05	01	74, 200
Harshaw	3 35	60	12, 750
Highland Chief	1 75	45	700
Hortense	31	10	69, 700
Index	51	48	300
Lacrosse	32	13	121, 400
Lucerne	07	03	4, 600
Mariposa, preferred	2 50	10	4, 285
Mariposa, common	3 25	07	21, 730
May Belle	24	10	800
Mayflower	24	10	23, 700
Mexican	12 00	2 90	35, 457
Michoacan Syndicate	12 50	12 38	1, 100
Miner Boy	11	02	758, 600
Mineral Creek	07	01	345, 500
Mono	2 00	20	1, 550
Moose Silver	35	01	9, 100
North Standard	32	05	28, 000
North State	14	01	240, 900
Noonday	1 60	05	7, 515
Oriental and Miller	40	10	936, 100
Overman	75	75	30
Potosi	1 30	70	300
Quartz Creek	85	01	705, 300
Rappahannock	43	09	262, 190
Red Elephant	19	03	47, 225

Highest and lowest quotations and sales of stock of dividend and non-dividend paying mines, &c.—Continued.

NON-DIVIDEND-PAYING MINES—Continued.

Name of mine.	Highest.	Lowest.	Sales.
Retort Mining and Milling Company	$0 90	$0 75	11, 100
San Pedro	35	20	200
Silver Cliff	2 80	33	453, 015
Silver Nugget, old stock	09	06	5, 700
Silver Nugget, new stock	12	05	227, 625
Sonora Consolidated	1 10	06	15, 800
South Bodie	12	12	200
South Bulwer	27	15	2, 850
South Hite, new stock	44	05	198, 200
South Pacific	8 25	05	4, 867, 015
State Line, No. 1	13	04	1, 725
State Line, No. 4	35	05	1, 900
State Line, Nos. 1 and 4	29	02	554, 450
State Line, Nos. 2 and 3	1 80	07	354, 945
Sutro Tunnel	1 88	13	1, 931, 019
Taylor Plumas	1 00	01	1, 104, 600
Tioga	40	04	25, 950
Tuscarora	26	05	367, 400
Unadilla	15	03	162, 105
Union Consolidated	17 50	3 00	28, 720
Utah	90	90	100
Vandewater	40	16	346, 850
Washington	19	04	131, 800
Whalen Copper Company	24 13	15 75	4, 115
Wide West	1 50	1 50	100

Production of gold and silver from the mines of the State of Nevada during the calendar year ended December 31, 1882.

[Reported by State comptroller.]

Name of mine.	Quantity of ores worked.		Value.
	Tons.	Pounds.	
ELKO COUNTY.			
Central Consolidated	60	950	$3. 805 26
De Frees Mine	114	....	552 43
De Frees Mill	4	1, 500	85 66
Independence	201	1, 500	48, 035 82
Navajo	1, 968	301	272, 400 36
Total ores	2, 349	251	324, 879 53
Tailings worked	1, 850	1, 350	8, 904 93
Total yield	4, 199	1, 601	333, 784 46
ESMERALDA COUNTY.			
Great Western	36	1, 857	5, 819 80
Indian Queen	1, 835	75	104, 721 79
Lancashire	78	1, 200	11, 683 97
Mount Diablo	3, 072	1, 430	118, 979 38
Northern Belle	20, 798	....	765, 815 84
Wilson	120	....	4, 100 84
Total yield	25, 941	562	1, 011, 121 62
EUREKA COUNTY.			
Albion	2, 807	685	196. 902 03
Alexandria	10	202	324 29
Altoona	1	532	198 63
Antelope	2	689	145 39
Atlantic and Pacific	19	950	421 44
Bald Eagle	55	182	3, 124 30
Banner	135	264	6, 110 31
Benton	18	610	357 09
Bertrand Mining and Milling Company	8, 193	....	124, 251 62
Black Point	3	618	330 85

Production of gold and silver from the mines of the State of Nevada, &c.—Continued.

Name of mine.	Quantity of ores worked.		Value.
	Tons.	Pounds.	
EUREKA COUNTY—continued.			
Bowman	262	1, 441	$19, 300 86
Bullwhacker	121	1, 065	3, 922 01
Contention	9	500	1, 000 00
Dead Broke	42	250	2, 409 43
Dug Out	147	830	11, 739 03
Dunderberg	1, 119	1, 443	41, 343 53
Eldorado No. 2	48	1, 102	2, 946 86
Eureka Consolidated	22, 356	1, 000	990, 012 67
Eureka Tunnel and Mining Company	1, 205	467	74, 790 70
Excelsior	129	1, 789	3, 819 22
Extension	1	744	62 74
Garrison	980	1. 537	42, 671 25
Gilham	7	649	490 95
Hamburg	17	1, 763	544 24
Herculean	6	1, 670	136 70
Home Ticket	57	400	1, 502 51
Hoosac	51	530	1, 460 76
Hunter	3	466	359 31
Idaho	324	518	11, 211 95
Industry	2	1, 046	90 82
Irish Ambassador	12	810	2, 468 84
Jackson	630	1, 895	30, 039 02
Kentuck	8	1, 155	1, 215 38
Lizzie L	3	1, 153	156 58
Lone Pine	2	1, 550	54 11
Macon City	154	407	5, 230 56
Mayflower	16	937	256 54
Members	216	701	4, 592 54
Metamoras	106	255	4, 767 78
Molino and Frazer	7	1, 380	134 57
Mountain Boy	27	1, 572	3, 269 55
North Macon City	14	977	1, 569 05
Onondaga	31	191	2, 378 81
Oriental and Belmont	63	903	1, 530 95
Paul Pry	109	1, 004	4, 866 59
Phœnix	333	670	12, 581 48
Prospect Mountain Tunnel	55	147	1, 394 62
Republic	20	90	402 10
Richmond Consolidated	30, 445	1, 112	873, 610 55
Ruby and Dunderberg	555	....	10, 963 73
San José	16	858	1, 020 57
Seventy Six	63	104	4, 645 79
Silver Corner	147	1, 321	$9, 894 18
Silver King	34	780	524 45
Silver Lick	266	695	11, 321 18
Silver West	2	887	108 14
Star	1	623	118 72
War Eagle	9	1, 118	251 47
Wide West	10	1, 600	172 80
Williams	63	31	3, 071 15
Williamsburg	269	1, 266	8, 713 09
Total yield	71, 840	134	2, 453, 306 38
HUMBOLDT COUNTY.			
Auburn Consolidated	600	....	1, 500 00
Bullion of Paradise	3, 231	1, 050	38, 373 14
Winnemucca Reduction Works	111	....	2, 724 00
Total yield	3, 942	1, 050	42, 597 14
LANDER COUNTY.			
Betty O'Neal	823	1, 800	79, 430 17
Black Ledge	6	1, 108	3, 496 71
Holman & Co	10	1, 166	4, 534 03
Manhattan Silver Mining Company	1, 854	....	377, 645 58
Mullens	4	906	6, 388 57
New Battle Mountain	500	1, 456	39, 679 58
Patriot	84	1, 394	31, 197 45
Plymouth	25	1, 344	16, 472 21
Renfree & Co	35	708	6, 901 58
Silver Wedge	1	968	3, 494 44
Victoria	809	....	6, 724 16
Total yield	4, 156	850	575, 964 48

Production of gold and silver from the mines of the State of Nevada, &c.—Continued.

Name of mine.	Quantity of ores worked.		Value.
	Tons.	Pounds.	
LINCOLN COUNTY.			
Alps	2	880	$350 90
Bristol Silver Mining Company	1, 058	....	55, 261 36
Bullionville Smelting Company	17, 136	1, 194	97, 572 93
Day Silver Mining Company	4, 076	....	122, 074 58
Dry Valley concentrations	34	1, 984	1, 208 57
Lazard Frères	10	742	1, 039 74
Lucky Jim	7	484	873 56
Mountain Boy	3	570	177 15
Southwestern	1, 794	....	70, 560 34
Vermillion	3	1, 636	403 65
Total ores	24, 126	1, 490	349, 522 78
Tailings worked	14, 261	308	108, 283 78
Total yield	38, 387	1, 798	457, 806 56
LYON COUNTY.			
Atlanta Mill	9, 340	....	28, 801 61
Excelsior Mill	1, 620	....	6, 934 35
Franklin Mill	810	....	1, 885 07
J. M. Douglass & Co. Mill	17, 215	....	45, 848 69
Little Bonanza Mill	1, 480	....	12, 540 00
Lyon Milling and Mining Company	20, 308	....	86, 200 88
Total yield	50, 773	....	182, 210 60
NYE COUNTY.			
Blue Bell	9	873	1, 359 22
Continental	116	1, 500	12, 692 18
Downieville	539	....	24, 845 20
Downieville Smelting Works	378	....	17, 812 80
Gold Park	69	1, 000	3, 954 37
Grey Eagle	3	386	213 77
Harrison Brothers	1, 900	....	13, 200 00
McPherson	2	450	505 14
Morey	298	142	32, 997 43
Nevada Mining Company	1, 353	50	12, 787 93
Queen Elizabeth	5	168	1, 085 74
Tybo Consolidated	3, 768	200	89, 902 07
Twin River	300	....	4, 860 77
Total yield	8, 742	769	216, 216 62
ORMSBY COUNTY.			
Brunswick Mill	1, 506	....	6, 975 13
Total yield	1, 506	....	6, 975 13
STOREY COUNTY.			
Belcher	18, 398	1, 090	303, 095 91
California	610	1, 910	10, 122 86
Challenge	414	....	5, 703 18
Chollar Potosi	1, 440	....	24, 166 03
Confidence	572	....	8, 211 28
Consolidated Imperial	2, 697	1, 000	37, 328 37
Crown Point	40, 196	....	442, 967 05
Kentuck	5, 939	....	156, 652 22
Ophir	3, 666	1, 090	74, 230 51
Union Consolidated	10, 743	1, 860	318, 291 12
Yellow Jacket	5, 493	60	88, 044 78
Total ores	90, 171	1, 010	1, 468, 213 31
Tailings worked	24, 440	....	106, 883 66
Total yield	114, 611	1, 010	1, 575, 096 97
WHITE PINE COUNTY.			
Bay State	154	55	11, 583 41
Chloride	25	754	2, 193 13
El Capitan	150	....	2, 500 00
Exchange	282	....	6, 486 00
Gore	483	....	23, 014 10
Monitor	1, 625	....	71, 393 40
Mountain Queen	30	....	922 55
Star	3, 053	....	139, 594 70
Total ores	5, 802	809	257, 687 29
Tailings worked	800	....	8, 000 00
Total yield	6, 602	809	265, 687 29

Gross yield of the mines of Nevada, by counties, for six months' periods, and for the calendar years 1881 *and* 1882.

[From reports of the State comptroller.]

FOR THE SIX MONTHS ENDING JUNE 30.

Counties.	1881.			1882.		
	Quantity worked.		Gross yield or value.	Quantity worked.		Gross yield or value.
	Tons.	Pounds.		Tons.	Pounds.	
Elko	2,488	1,825	$122,193 21	2,051	200	$12,384 29
Esmeralda	19,436	1,666	749,521 83	14,270	861	627,766 56
Eureka	38,824	1,656	1,612,774 51	33,740	1,620	1,261,777 29
Humboldt	5.017	866	45,611 16	2,715	450	21,536 31
Lander	3,976	596	491,235 97	1,689	1,505	282,004 85
Lincoln	6,625	1,925	80,559 61	1,852	484	97,680 54
Lyon	39,760	....	146,778 61	....	....	....
Nye	6,551	583	188,908 45	2,400	365	79,030 24
Ormsby	7,075	....	35,321 07	....	....	....
Storey	48,887	539	861,731 10	42,918	330	759,501 25
Washoe	2,640	....	18,588 87	....	....	....
White Pine	5,056	....	189,283 28	2,783	754	112,287 63
Total	186,339	1,656	4.542,507 67	104,421	569	3,253,968 96

FOR THE SIX MONTHS ENDING DECEMBER 31.

Elko	175	1,800	$34,156 40	2,148	1,401	$321,400 17
Esmeralda	17,072	392	623,306 70	11,670	1,701	383,355 06
Eureka	36,670	1,167	1,462.206 27	38,099	514	1,191,529 09
Humboldt	3,892	606	30,687 55	1,227	600	21,060 83
Lander	2,982	481	438,559 92	2,466	1,345	293,959 63
Lincoln	7,838	1,298	221,249 28	36,535	1,314	360,126 02
Lyon	47,294	....	248,372 86	50,773	....	182,210 60
Nye	5,596	1,834	173,523 09	6,342	404	137,186 38
Ormsby	19,001	....	75,076 81	1,506	....	6,975 13
Storey	60,088	1,560	607,187 34	71,693	680	815,595 72
Washoe	2,616	....	20,944 55	....	....	....
White Pine	3,934	1,205	175,501 09	3,819	55	153,399 66
Total	207,163	343	4,110,771 86	226,282	14	3,866,798 29

FOR THE CALENDAR YEAR.

Elko	2,664	1,625	$156,349 61	4,199	1,601	$333,784 46
Esmeralda	36,509	58	1,372,828 53	25,941	562	1,011,121 62
Eureka	75,495	823	3,074,980 78	71,840	134	2,453,306 38
Humboldt	8,909	1,472	76,298 71	3,942	1,050	42,597 14
Lander	6,958	1,077	929,795 89	4,156	850	575,964 48
Lincoln	14,464	1,223	301,808 89	38,387	1,798	457,806 56
Lyon	87,054	....	395,151 47	50,773	....	182,210 60
Nye	12,148	417	362,431 54	8,742	769	216,216 62
Ormsby	26,076	....	110,397 88	1,506	....	6,975 13
Storey	108,976	99	1,468,918 44	114,611	1,010	1,575,096 97
Washoe	5,256	....	39,533 42	....	....	....
White Pine	8,990	1,205	364,784 37	6,602	809	265,687 29
Total	393,502	1,999	8,653,279 53	330,703	583	7,120,767 25

World's production of gold and silver.

[Calendar years, except for United States and Japan.]

Countries.	1879.				1880.				1881.			
	Gold.		Silver.		Gold.		Silver.		Gold.		Silver.	
	Kilos.	*Dollars.*	*Kilos.*	*Dollars.*	*Kilos.*	*Dollars.*	*Kilos.*	*Dollars.*	*Kilos.*	*Dollars.*	*Kilos.*	*Dollars.*
United States	58, 531	38, 899, 858	981, 825	40, 812, 132	54, 168	36, 000, 000	942, 987	39, 200, 000	52, 212	34, 700, 000	1, 034, 649	43, 000, 000
Russia	*42, 960	28, 551, 028	*11, 391	473, 519	†42, 960	28, 551, 028	†11, 391	473, 519	†42, 960	28, 551, 028	†11, 391	473, 519
Australia	‡43, 282	28, 765, 000	‡5, 465	227, 125	43, 282	28, 765, 000	5, 465	227, 125	§46, 836	31, 127, 515	‡5, 465	227, 125
Mexico	1, 488	989, 160	605, 469	25, 167, 763	†1, 488	989, 160	†605, 469	25, 167, 763	†1, 488	989, 160	†605, 469	25, 167, 763
Germany	‖*a*388	257, 865	‖*a*134,007	5, 570, 380	*a*350	232, 610	*a*134, 152	5, 576, 699	‡350	232, 610	‡134, 152	5, 576, 699
Austro-Hungary	1, 598	1, 062, 031	48, 180	2, 002, 727	1, 647	1, 094, 596	48, 000	1, 994, 880	1, 867	1, 240, 808	31, 359	1, 303, 280
Sweden	003	1, 994	1, 502	62, 435	005	3, 323	1, 312	54, 527	‡005	3, 323	1, 312	54, 527
Norway	....	....	‡4, 436	184, 360	....	....	4, 436	184, 360	....	....	‡4, 436	184, 360
Italy	*b*109	72, 375	*b*432	17, 949	*b*109	72, 375	‖432	17, 949	*b*109	72, 375	*b*432	17, 949
Spain	....	....	‡74, 500	3, 096, 220	....	....	74, 500	3, 096, 220	....	....	‡74, 500	3, 096, 220
Turkey	‡007	4, 918	†1, 719	71, 441	007	4, 918	1, 719	71, 441	‡007	4, 918	‡1, 719	71, 441
Argentine Republic	118	78, 546	10, 109	420, 225	†118	78, 546	†10, 109	420, 225	†118	78, 546	†10, 109	420, 225
Colombia	6, 019	4, 000, 000	24, 057	1, 000, 000	†6, 019	4, 000, 000	†24, 057	1, 000, 000	†6, 019	4, 000, 000	†24, 057	1, 000, 000
Bolivia	*c*109	72, 345	*c*264, 677	11, 000, 000	*c*109	72, 345	*c*264, 677	11, 000, 000	109	72, 345	264, 677	11, 000, 000
Chili	*c*194	128, 869	*c*122, 275	5, 081, 747	*c*194	128, 869	*c*122, 275	5, 081, 747	194	128, 869	122, 275	5, 081, 747
Brazil	1, 510	1, 003, 546	....	....	1, 345	893, 887	....	....	1, 116	741, 694	....	....
Japan	702	466, 548	22, 046	916, 400	†702	466, 548	†22, 460	916, 400	†702	466, 548	†22, 046	916, 400
Africa	‖3, 000	1, 993, 800	....	....	†3, 000	1, 993, 800	....	....	†3, 000	1, 993, 800	....	....
Venezuela	2, 431	1, 615, 835	....	....	3, 423	2, 274, 692	....	....	‡3, 423	2, 274, 692	....	....
Canada	‡1, 226	815, 089	‡1, 641	68, 205	1, 226	815, 089	1, 641	68, 205	*d*1, 648	1, 094, 926	‡1, 641	68, 205
Total	163, 675	108, 778, 807	2, 313, 731	96, 172, 628	160, 152	106, 436, 786	2, 274, 668	94, 551, 060	162, 163	107, 773, 157	2, 349, 689	97, 659, 460

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* Official estimate, "L'Economiste Français," July, 1881, p. 112.
† Estimated the same as 1879.
‡ Estimated the same as 1880.
§ Production for 1880 with increased production of Victoria, New South Wales, and Tasmania in 1881 added.
‖ Dr. A. Soetbeer.
a From total production 17 per cent. of gold and 25 per cent. of silver deducted for foreign ores.
b Estimated.
c Estimated same as 1881.
d Production of British Columbia only, shipped through Wells, Fargo & Co., and the official report of the yield of the mines of Nova Scotia.

Coinage of various countries.

[Calendar years, except for Japan and the United States, for 1879 and 1880.]

Countries.	1879.		1880.		1881.	
	Gold.	Silver.	Gold.	Silver.	Gold.	Silver.
United States	$39, 080, 080	$27, 568, 235	$62, 308, 279	$27, 409, 706	$96, 850, 890	$27, 939, 203
Mexico	658, 206	22, 162, 987	....	....	438, 778	24, 139, 023
Bolivia	....	....	....	....	....	1, 970, 983
Venezuela	....	....	324, 024	....	....	....
Hayti	....	....	....	....	....	780, 000
Great Britain	170, 571	2, 671, 971	20, 196, 228	3, 705, 878	....	4, 852, 523
Australia	20, 210, 574	....	22, 151, 334	....	19, 699, 115	....
India	402	28, 122, 004	69, 670	40, 002, 173	....	20, 682, 625
Germany	11, 043, 120	....	6, 662, 153	....	1, 634, 189	....
Austria	1, 001, 592	12, 869, 784	2, 468, 029	8, 373, 563	2, 429, 998	9. 028, 671
France	5, 494, 834	....	....	....	418, 231	1, 299, 554
Belgium	....	....	....	150, 639	....	38, 055
Italy	565, 355	3, 860, 000	499, 997	....	3, 253, 988	1, 598, 346
Netherlands	2, 403, 223	44, 806	259, 313	40, 200	....	....
Denmark	*9, 314, 143	*4, 863 725	....	....	....	....
Norway	....	....	....	499	....	....
Sweden	....	....	752, 992	223, 094	11, 149, 950	3, 862, 798
Spain	....	....	33, 113, 719	268, 955	....	....
Portugal	262, 451	396, 954	348, 765	145, 492	....	....
Japan	509, 942	2, 327, 847	460, 365	2, 076, 955	490, 585	4, 514, 043
Brazil	38, 318	....	30, 368	....	21, 659	....
Total	90, 752, 811	104, 888, 313	149, 645, 236	82, 397, 154	136, 387, 383	100, 705, 824

* Coinage for 1876, 1877, and 1878, to March 31, 1879; no coinage executed since 1879.

Circulation.

Countries.	Population.		Date for which circulation is stated.	Paper.	Specie.				Total paper currency and specie.	Per capita.	
	Year.	Latest census or estimate.*			Gold.	Silver, full legal tender.	Silver, limited tender.	Total.		Paper.	Specie.
United States	1880	50,155,783	Oct. 1, 1882	$793,074,878	$563,631,455	$129.524,755	$80,428,580	$773,584,790	$1,566,659,668	$15 81	$15 42
Great Britain and Ireland	1881	35,246,562	July 1, 1882	†203,692,764	592,000,000	...	92,600,000	684,600,000	888,292,764	5 77	19 14
Dominion of Canada, including Manitoba and Newfoundland.	1881	4,506,563	July 31, 1882	‡45,117,162	9,026,000	...	1,020,000	10,046,000	55,163,162	10 01	2 23
British India	1881	252,541,210	July 31, 1882	55,874,880	...	§1,015,000,000	...	1,015,000,000	1,070,874,880	22	4 02
Australia, Tasmania, and New Zealand.	1881	2,798,898	July 31, 1882	‖23,891,250	*a*54,214,123	...	...	54,214,123	78,105,373	8 53	19 37
France	1881	37,321,186	Sept. 7, 1882	*b*512,129,625	*c*874,876,000	*c*545,286,000	57,900,000	1,478,062,000	1,990,191,625	13 72	39 60
Belgium	1879	5,536,654	Aug. 31, 1882	*d*64,529,719	103,000,000	53,000,000	6,326,000	162,326,000	226,855,719	11 65	29 31
Switzerland	1880	2,846,102	Apr. 30, 1882	*e*16,623,964	*f*20,000,000	*f*10,000,000	*f*4,700,000	34,700,000	51,323,964	5 84	12 19
Italy	1881	28,452,639	May 13, 1882	*g*293,772,885	*h*144,750,000	*h*40,000,000	*h*30,000,000	214,750,000	508,522,885	10 33	7 54
Greece	1882	1,979,423	Jan. 31, 1882	*i*18,325,356	1,000,000	800,000	...	*a*1,800,000	20,125,356	9 26	91
Spain	1877	16,625,860	July 31, 1882	*g*62,573,457	*j*130,000,000	*j*40,000,000	*j*30,000,000	200,000,000	262,573,457	3 75	12 03
Portugal, including Azores and Madeira.	1878	4,550,699	Jan. 1, 1879	5,023,360	*j*48,000,000	...	*j*12,000,000	60,000,000	65,023,360	1 10	13 18
Germany	1880	45,234,061	Aug. 23, 1882	‡211,122,464	387,143,742	119,000,000	101,648,835	607,792,577	818,915,041	4 67	13 43
Austria-Hungary	1880	35,839,428	Aug. 23, 1882	‡299,091,135	*a*32,751,545	*a*52,898,855	...	85,650,400	384,741,535	8 34	2 39
Sweden and Norway	1880	6,479,168	Dec. 31, 1880	34,397,563	21,072,000	...	4,020,000	25,092,000	59,489,563	5 31	3 87
Danish Kingdom	1880	2,096,400	Dec. 31, 1881	20,158,767	10,000,000	...	4,327,000	14,327,000	34,485,767	9 62	16 45
Netherlands	1880	4,061,580	Aug. 26, 1882	‡78,107,596	29,304,722	56,488,551	...	85,793,273	163,900,869	19 23	21 12
Russia	1880	98,323,000	Aug. 13, 1882	‡612,916,209	*k*119,209,784	...	...	119,209,784	732,125,993	6 23	1 21
Turkey	1880	24,987,000	...	...	*l*15,000,000	...	*l*589,828	15,589,828	15,589,828	...	63
Roumania	1881	5,376,000	...	...	...	*h*10,000,000	*h*5,000,000	15,000,000	15,000,000	...	2 79
Mexico	1880	9,557,279	Nov. 18, 1879	1,500,000	*l*10,000,000	*l*40,000,000	...	50,000,000	51,500,000	16	5 23
Central America	1881	2,891,600	June 30, 1880	163,347	2,318,381	373,919	...	2,692,300	2,855,647	06	93
Argentine Republic	1880	2,540,000	June 30, 1881	37,101,756	4,000,000	2,000,000	...	6,000,000	43,101,756	14 60	2 36
Colombia	1881	3,000,000	Aug. 18, 1879	1,895,343	500,000	...	4,000,000	4,500,000	6,395,343	63	1 50
Brazil	1880	11,108,291	Sept. 30, 1881	*m*188,155,455	...	...	...	...	188,155,455	16 94	...
Peru	1876	3,050,000	Mar. —, 1879	13,098,820	62,085	1,819,933	...	1,882,018	14,980,838	4 29	62
Venezuela	1881	2,675,245	Sept. —, 1881	250,900	*l*10,000,000	...	*l*1,000,000	11,000,000	11,250,900	09	4 11
Chili	1876	2,420,500	Dec. 31, 1881	26,555,341	...	2,500,000	...	2,500,000	29,055,341	10 97	1 03
Bolivia	1876	2,325,000	Dec. 31, 1881	1,131,517	...	5,400,000	...	5,400,000	6,531,517	49	2 32
Cuba	1877	1,394,516	Dec. 31, 1881	*n*40,824,884	*n*27,890,000	*n*1,000,000	...	28,890,000	69,714,884	29 26	20 71
Hayti	1877	572,000	...	...	4,000,000	780,000	...	4,780,000	4,780,000	...	8 36

Japan	1874	33, 623, 319	June 30, 1880	147, 283, 681	99, 852, 138	50, 661, 873	....	150, 514, 016	297, 802, 697	4 38	4 48
Algiers	1877	2, 867, 626	July —, 1881	11, 194, 000	10, 071, 773	6, 234, 975	....	16, 306, 748	27. 500, 748	2 90	9 59
Cape of Good Hope	1880	780, 757	June 30, 1882	[o]5, 637, 000	[l]30, 000, 000	....	[l]2, 440, 726	32, 440, 726	38, 077, 726	7 22	41 54
Total	......	....	....	3, 825, 220, 078	3, 353, 673, 748	2, 182, 768, 866	438, 000, 969	5, 974, 443, 583	9, 799, 663, 661	......	.....

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* Die Bevölkerung der Erde, Gotha, Drs. Behm and Wagner. Except United States, Cuba, Japan, and Algiers, which are official; and Hayti, which was estimated.

† London Banker's Magazine for August.

‡ London Economist, September 21, 1882.

§ Based on statement of director of Calcutta mint of 1879, with coinage for ten years added.

‖ London Banker's Magazine for June.

[a] Bank reserve only.

[b] London Economist, September 19, 1882.

[c] Estimated from amount from report of 1879: Exports, Imports, and Consumption in the Arts.

[d] London Economist, September 9, 1882.

[e] London Economist, April 8, 1882.

[f] M. Welti, President Swiss Confederation: "Gold and Silver," page 193.

[g] London Economist, August 12, 1882.

[h] Paris Bourse, September 19, 1882.

[i] London Economist, July 18, 1882.

[j] Silver Commission, page 510, and page 475

[k] London Economist, September 10, 1881.

[l] Estimated.

[m] London Economist, February 25, 1882.

[n] New York Banker's Magazine, March 18, 1882.

[o] London Economist, August 26, 1882.

Table of government and bank-paper issue and metallic reserves.

Countries.	Date referred to.	Paper.			Metallic reserve.						
					Treasury.			Bank.			Aggregate.
		Government issue.	Bank issue.	Total.	Gold.	Silver.	Total.	Gold.	Silver.	Total.	
United States	Oct. 1, 1882, & July 1, 1882	*$430, 185, 744	$362, 889, 134	$793, 074, 878	$138, 375, 902	$64, 039, 921	$202, 415, 823	$123, 943, 999	$7, 750, 263	$131, 694, 262	$334, 110, 085
Great Britain and Ireland.	July 1, 1882		†203, 692, 764	203, 692, 764						†149, 825, 096	149, 825, 096
Dominion of Canada, including Manitoba and Newfoundland.	Dec. 31, 1880, & July 31, 1882.	14, 234, 353	‡30, 882, 809	45, 117, 162	3, 026, 000	120, 000	3, 146, 000	5, 500, 000	400, 000	5, 900, 000	9, 046, 000
British India	Dec. 31, 1880	55, 874, 880		55, 874, 880		22, 335, 493	22, 335, 493		2, 693, 155	2, 693, 155	25, 028, 618
Australia, Tasmania, and New Zealand.	Dec. 31, 1880		§23, 891, 250	23, 891, 250				§54, 214, 123		54, 214, 123	54, 214, 123
France	Sept. 7, 1882		‖512, 129, 625	512, 129, 625				‡193, 776, 831	‖221,037,113	414, 813, 944	414, 813, 944
Belgium	Aug. 31, 1882		‖64, 529, 719	64, 529, 719						‡18, 998, 816	18, 998, 816
Switzerland	Apr. 1, 1882		*a*16, 623, 964	16, 623, 964						*a*7, 528, 475	7, 528, 475
Italy	Dec. 31, 1881 & May 13, '82	*b*181, 420, 000	*b*112, 352, 885	293, 772, 885	*b*100, 000, 000	*b*40, 000, 000	140, 000, 000	*b*22, 000, 000	*b*13, 000, 000	35, 000, 000	175, 000, 000
Greece	Jan. 31, 1882		*c*18, 325, 356	18, 325, 356						*c*1, 800, 000	1, 800, 000
Spain	Jan. 31, 1882		*d*62, 573, 457	62, 573, 457	775, 444	2, 019, 923	2, 795, 367			*d*24, 916, 480	27, 711, 847
Portugal	Jan. 1, 1879		5, 023, 360	5, 023, 360						9, 508, 169	9, 508, 169
Germany	Aug. 23, 1882	37, 076, 958	‡174, 045, 506	211, 122, 464				125, 000, 000	9, 680, 387	‡134, 680, 387	134, 680, 387
Austria-Hungary	June 30, 1879 & Aug. 23, '82	128, 860, 965	‡170, 230, 170	299, 091, 135				‡32, 751, 545	‡52, 898, 855	85, 650, 400	85, 650, 400
Sweden and Norway	Dec. 31, 1880		34, 397, 563	34, 397, 563				12, 662, 315	2, 553, 572	15, 215, 887	15, 215, 887
Danish Kingdom	Dec. 31, 1881		20, 158, 767	20, 158, 767				7, 772, 000	750, 400	8, 522, 400	8, 522, 400
Netherlands	Dec. 31, 1880 & Aug. 26, '82	4, 020, 000	‡74, 087, 596	78, 107, 596						‡44, 377, 613	44, 377, 613
Russia	Aug. 13, 1882		‡612, 916, 209	612, 916, 209						‡123, 774, 021	123, 774, 021
Mexico	Nov. —, 1879		*c*1, 500, 000	1, 500, 000							
Central America	June 30, 1880		163, 347	163, 347							
Argentine Republic	June 30, 1881		37, 101, 756	37, 101, 756							
Colombia	Aug. 18, 1879		1, 895, 343	1, 895, 343					200, 000	200, 000	200, 000
Brazil	Sept. 30, 1881	*f*188, 155, 455		188, 155, 455							
Peru	Mar. 1, 1879	13, 098, 820		13, 098, 820				62, 085	1, 819, 933	1, 882, 018	1, 882, 018

[*] Includes $71,569,210 in silver certificates.
[†] London Bankers' Magazine, August, 1882.
[‡] London Economist, September 2, 1882.
[§] London Bankers' Magazine, June 8, 1882.
[‖] London Economist, September 9, 1882.
[a] London Economist, April 8, 1882.
[b] Paris Bourse, September 19, 1882.
[c] London Economist, July 8, 1882.
[d] London Economist, August 12, 1882.
[e] Estimated.
[f] London Economist, February 25, 1882.

Venezuela	Sept. —, 1881	....	250, 900	250, 900	....	....	....	....	....	....	....
Chili	Dec. 31, 1881	....	26, 555, 341	26, 555, 341	....	....	798, 000	....	....	1, 600, 000	2, 398, 000
Bolivia	Dec. 31, 1881	....	1, 131, 517	1, 131, 517	....	....	....	....	443, 597	443, 597	443, 597
Cuba	Mar. 26, 1881	....	*g*40, 824, 884	40, 824, 884	....	....	....	*g*24, 000, 000	....	24, 000, 000	24, 000, 000
Cape of Good Hope	June 30, 1882	....	*h*5, 637, 000	5, 637, 000	....	....	....	*h*8, 092, 000	....	8, 092, 000	8, 092, 000
Japan	June 30, 1880	130, 127, 596	17, 161, 085	147, 288, 681	10, 399, 626	4, 139, 701	14, 539, 327	955, 988	399, 174	1, 355, 162	15, 894, 489
Algiers	July 18, 1881	....	11, 194, 000	11, 194, 000	35, 773	155, 475	191, 248	4, 053, 000	2, 026, 500	6, 079, 500	6, 270, 748
Total	....	1, 183, 054, 771	2, 642, 165, 307	3, 825, 220, 078	252, 612, 745	132, 810, 513	386, 221, 258	614, 783, 886	315, 652, 949	1, 312, 765, 505	1, 698, 986, 763

g New York Bankers' Magazine, March, 1882.

h London Economist, August 26, 1882.

Table showing the total paper and specie circulation in each of the principal countries of the world, the amount of specie in bank and national treasuries, and the amount of active circulation.

Countries.	Population.	Total metallic and paper circulation.	Amount of specie in banks and national treasuries.	Active circulation.	Per capita of active circulation.
United States	50, 155, 783	$1, 566, 659, 668	$334, 110, 085	$1, 232, 549, 583	24. 57
Great Britain and Ireland	35, 246, 562	888, 292, 764	149, 825, 096	738, 467, 668	20. 95
Dominion of Canada, including Manitoba and Newfoundland	4, 506, 563	55, 163, 162	9, 046, 000	46, 117, 162	10. 66
British India	252, 541, 210	1, 070, 874, 880	25, 028, 648	1, 045, 846, 232	4. 14
Australia, Tasmania, and New Zealand	2, 798, 898	78, 105, 373	54, 214, 123	23, 891, 250	8. 53
France	37, 321, 186	1, 990, 191, 625	414, 813, 944	1, 575, 377, 681	42. 21
Belgium	5, 536, 654	226, 855, 719	18, 998, 816	207, 856, 903	37. 54
Switzerland	2, 846, 102	51, 323, 964	7, 528, 475	43, 795, 489	15. 38
Italy	28, 452, 639	508, 522, 885	175, 000, 000	333, 522, 885	11. 72
Greece	1, 979, 423	20, 125, 356	1, 800, 000	18, 325, 356	9. 24
Spain	16, 625, 860	262, 573, 457	27, 711, 847	234, 861, 610	14. 13
Portugal	4, 550, 699	65, 023, 360	9, 508, 169	55, 515, 191	11. 99
Germany	45, 234, 061	318, 915, 041	134. 680, 387	684, 234, 654	15. 13
Austria-Hungary	35, 839, 428	384, 741, 535	85, 650, 400	299, 091, 135	8. 35
Sweden and Norway	6, 479, 168	59, 489, 563	15, 215, 887	44, 273, 676	6. 88
Danish Kingdom	2, 096, 400	34, 485, 767	8, 522, 400	25, 963, 367	12. 38
Netherlands	4, 061, 580	163, 900. 869	44, 377, 613	119, 523, 256	29. 43
Russia	98, 323, 000	732, 125, 993	123, 774, 021	608, 351, 972	6. 18
Mexico	9, 557, 279	51, 500, 000	....	51, 500, 000	5. 39
Central America	2, 891, 600	2, 855, 647	....	2, 855, 647	0. 98
Argentine Republic	2, 540, 000	43, 101, 756	....	43, 101, 756	16. 96
Colombia	3, 000, 000	6, 395, 343	200, 000	6, 195, 343	2. 06
Brazil	11, 108, 291	188, 155, 455	....	188. 155, 455	16. 94
Peru	3, 050, 000	14, 980, 838	1, 882, 018	13, 098, 820	4. 29
Venezuela	2, 675, 245	11, 250, 900	....	11, 250, 900	4. 20
Chili	2, 420, 500	29, 055, 341	2, 398, 000	26, 657, 341	11. 11
Bolivia	2, 325, 000	6, 531, 517	443, 597	6, 087, 920	2. 62
Cuba	1, 394, 516	69, 714, 884	24, 000, 000	45, 714, 884	33. 51
Cape of Good Hope	780, 757	38, 077, 726	8, 092, 000	29, 985, 726	38. 39
apan	33, 623, 319	297, 802, 697	15, 894, 489	281, 908, 208	8. 39
Algiers	2, 867, 626	27, 500, 748	6, 270, 748	21, 230, 000	7. 40
Turkey	24, 987, 000	15, 589, 828	....	15, 589, 828	0. 62
Roumania	5, 376, 000	15, 000, 000	....	15, 000, 000	2. 80
Hayti	572. 000	4, 780, 000	....	4, 780, 000	8. 53
		9, 799, 663, 661	1, 698, 986, 763	8. 100, 676, 898	

[1883. Department No. 1. Secretary's Office.]

Circular estimating and proclaiming, in United States money of account, the values of the standard coins in circulation of the various nations of the world.

TREASURY DEPARTMENT, BUREAU OF THE MINT,
Washington, D. C., January 1, 1883.

SIR: In pursuance of the provisions of section 3564 of the Revised Statutes of the United States, I have estimated the values of the standard coins in circulation of the various nations of the world, and submit the same in the accompanying table.

Very respectfully.

HORATIO C. BURCHARD,
Director.

HON. CHAS. J. FOLGER,
Secretary of the Treasury.

Estimate of values of foreign coins

Country.	Monetary unit.	Standard.	Value in United States money.	Standard coin.
Argentine Republic	Peso	Gold and silver	\$0. 96, 5	$\frac{1}{20}$, $\frac{1}{10}$, $\frac{1}{5}$, $\frac{1}{2}$, and 1 peso, $\frac{1}{2}$ argentine and argentine.
Austria	Florin	Silver	. 40. 1	
Belgium	Franc	Gold and silver	. 19. 3	5, 10, and 20 francs.
Bolivia	Boliviano	Silver	. 81. 2	Boliviano.
Brazil	Milreis of 1,000 reis	Gold	. 54. 6	
British Possessions in North America.	Dollar	Gold	1. 00	
Chili	Peso	Gold and silver	. 91. 2	Condor, doubloon, and escudo.
Cuba	Peso	Gold and silver	. 93. 2	$\frac{1}{16}$, $\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{2}$, and 1 doubloon.
Denmark	Crown	Gold	. 26. 8	10 and 20 crowns.
Ecuador	Peso	Silver	. 81. 2	Peso.
Egypt	Piaster	Gold	. 04. 9	5, 10, 25, 50, and 100 piasters.
France	Franc	Gold and silver	. 19. 3	5, 10, and 20 francs.
Great Britain	Pound sterling	Gold	4. 86. 6$\frac{1}{2}$	$\frac{1}{2}$ sovereign and sovereign.
Greece	Drachma	Gold and silver	. 19. 3	5, 10, 20, 50, and 100 drachmas.
German Empire	Mark	Gold	. 23. 8	5, 10, and 20 marks.
Hayti	Gourde	Gold and silver	. 96. 5	1, 2, 5, and 10 gourdes.
India	Rupee of 16 annas	Silver	. 38. 6	
Italy	Lira	Gold and silver	. 19. 3	5, 10, 20, 50, and 100 lire.
Japan	Yen	Silver	. 87. 6	1, 2, 5, 10, and 20 yen, gold, and silver yen.
Liberia	Dollar	Gold	1. 00	
Mexico	Dollar	Silver	. 88. 2	Peso or dollar, 5, 10, 25, and 50 centavo.
Netherlands	Florin	Gold and silver	. 40. 2	
Norway	Crown	Gold	. 26. 8	10 and 20 crowns.
Peru	Sol	Silver	. 81. 2	Sol.
Portugal	Milreis of 1,000 reis	Gold	1. 08	2, 5, and 10 milreis.
Russia	Rouble of 100 copecks	Silver	. 65	$\frac{1}{4}$, $\frac{1}{2}$, and 1 rouble.
Spain	Peseta of 100 centimes.	Gold and silver	. 19. 3	5, 10, 20, 50, and 100 pesetas.
Sweden	Crown	Gold	. 26. 8	10 and 20 crowns.
Switzerland	Franc	Gold and silver	. 19. 3	5, 10, and 20 francs.
Tripoli	Mahbub of 20 piasters.	Silver	. 73. 3	
Turkey	Piaster	Gold	. 04. 4	25, 50, 100, 250, and 500 piasters.
United States of Colombia.	Peso	Silver	. 81. 2	Peso.
Venezuela	Bolivar	Gold and silver	. 19. 3	5, 10, 20, 50, and 100 Bolivar.

TREASURY DEPARTMENT,
Washington, D. C., January 1, 1883.

The foregoing estimation, made by the Director of the Mint, of the value of the foreign coins above mentioned, I hereby proclaim to be the values of such coins expressed in the money of account of the United States, and to be taken in estimating the values of all foreign merchandise, made out in any of said currencies, imported on or after January 1, 1883.

CHAS. J. FOLGER,
Secretary of the Treasury.

PART III.

MISCELLANEOUS.

MISCELLANEOUS.

AMALGAMATING GOLD AND SILVER.

[From the San Francisco Mining and Scientific Press.]

So much attention is just now being directed to the question of the profitable extraction of gold and silver from their ores that the description of every new process brought forward is read with general interest. The invention of Mr. L. F. Gowans, of Cheapside, described in the London Mining Journal, relates more especially to machinery used for amalgamating, or extracting by means of metallic mercury, the particles of gold obtained in auriferous quartz, stamped or otherwise pulverized, or of silver from silver ores similarly reduced to powder. It has for its objects novel methods of constructing and arranging machinery or apparatus by means of which the metal to be extracted is brought into intimate contact with the mercury, so that every particle during its passage through the machine is necessarily brought into such contact with the mercury, and great saving of the latter as well as of the gold or silver which is to be extracted is effected, as compared with machinery or apparatus for such purpose as heretofore ordinarily constructed and used, in which a considerable part of the metal, especially the very minute particles, passes away from the machine without being detained by the mercury, and either escapes and is lost or has to be recovered by subsequent processes. In order to put the invention in operation, he takes a vertical hollow shaft of sufficient height, revolving in bearings formed upon or attached to a suitable framework or support of wood or other material, and having at its upper end a hopper into which the auriferous sand, powdered quartz or other material to be treated is admitted, together with a sufficient quantity of water. The auriferous sand and water may be allowed to pass into the hopper directly from the stamps or other pulverizing machinery by which it has been reduced to powder, or it may be supplied gradually from any source by hand, or by elevators, endless screws, or other feeding mechanism of any of the ordinary well-known kinds.

The vertical hollow shaft and hopper are set in revolution at the required speed, which may be varied according to the character of the material being treated, by steam, water, or other convenient power. He prefers to drive it by means of a horizontal shaft set in motion by such power and revolving in bearings formed upon or attached to the framing which carries the vertical hollow shaft, one end of such horizontal shaft being fitted with a beveled toothed wheel gearing into and driving a corresponding beveled toothed pinion upon the vertical hollow shaft, and its other end being fitted with a pulley by which it is set in revolution. The weight of the hollow vertical shaft, and of the appliances hereinafter described which are attached to its lower end, is supported by a collar arranged at any convenient part of its length, preferably at its upper end, such collar resting upon a fixed support or bearing in which it revolves, preferably with the intervention of a sufficient number of steel rings or washers.

At the lower end of the hollow vertical shaft is fixed a block, preferably of cast iron, having a vertical central opening at its upper part which is fitted upon and attached to the shaft, the lower end of the opening communicating with a sufficient number (preferably four) of outlets curving downward and outward, through which the sand and water pass out into a circular horizontal pan or dish, preferably of wrought iron, which is supported upon a frame or foundation immediately below the hollow shaft. At the upper end of the hollow casting above described, where it is fitted upon the hollow shaft, is formed a collar, upon which is supported and fixed a horizontal muller or grinding plate, preferably of cast iron, which is made in four or more segments, bolted or keyed together, so that either of them can be readily removed or replaced when desired. The bottom of each of these segments is provided with a flat copper plate, riveted or otherwise fixed to it. A circular inclined or vertical flange is preferably formed on the outer diameter of the segments, concentric with but of less diameter than the edge of the pan already described, so that an annular space is left between them.

The action of the apparatus is this: The lower surface of the copper plates, which are amalgamated with mercury, being adjusted to revolve at a suitable distance, preferably about one inch and a half from the bottom of the pan, into which a sufficient quantity of mercury is placed, the vertical shaft, together with the copper-bottomed segments, are set in revolution, a supply of auriferous sand and water being admitted down the vertical hollow shaft from the hopper above. By the pressure of water the sand is pressed, not between the copper-plated muller and the mercury in the pan, but absolutely through the mercury in the latter and on the copper plates, and in this way it is impossible for any particle of gold to escape amalgamation provided the ore be crushed sufficiently fine. The sand from which the gold has been thus extracted passes from under the muller and is carried with the water over the edge of the pan in which the latter revolves. The muller being in segments, either segment can be readily removed or replaced when necessary.

Where auriferous or argentiferous ores are to be treated, in which the metal is coated or combined with the mundic or substance which has no affinity for mercury, he uses the following process: The ore being crushed or reduced to the necessary degree of fineness, either dry or being thoroughly dried after such crushing, he passes it in a dried state, through the machinery or apparatus already described, to the mercury, in which has been added, in the proportion of about one ounce to 4,500 ounces of mercury, the following composition: He heats mercury to a temperature of about 300° Fahr., and to every 100 ounces he adds 17 ounces of metallic sodium, in small particles at a time, in order to avoid dangerous combustion, and he mixes alloy in the above-named proportions with the mercury in the pan of the apparatus.

The presence of the sodium in the mercury frees the particles of metals in the sand from their coating of mundic or other such substance as described, and insures their thorough amalgamation whilst passing under the muller. He does not confine himself to the precise proportions of the material named, which may be varied slightly to suit the varying circumstances. Where the sand is passed dry through the machine or apparatus as described, it is not necessary that the vertical hollow shaft should be of such height as in the arrangement first described and the hopper may be arranged immediately above the revolving hollow block to which the compound muller is attached, the sand being made to pass under the copper plates by the revolution of the latter, aided, if necessary, by revolving blades or screws, by which it is forced down. The pan may in some cases be surrounded by a casing or jacket, steam or hot water being admitted into the space between, so that the mercury may be heated and kept at any desired temperature. The bottom of the muller may be provided with ribs or projections, or depressions, straight or curved, in order that every particle of the sand may more certainly be brought into contact with the mercury.

WET PROCESS FOR EXTRACTION OF GOLD AND SILVER.

[From the San Francisco Mining and Scientific Press.]

Wm. L. Thompson, of Boston, Mass., has invented a wet process for the extraction of gold and silver which has some curious features. The invention is intended for the extraction of precious metals from two subdivisions of the class of ores known as "smelting," in contradistinction to those known as "free milling" ores, viz: First, the pyrites division, bearing gold and some copper; and second, the silver and gold bearing division, containing antimony, arsenic, and the like. The invention consists in first removing the baser metals by the formation of soluble double sulphides of the baser metals and the alkaline metals, and secondly, removing the gold by the fusion of the residuum with an alkaline polysulphide, forming a soluble compound, from which the precious metals may be readily recovered.

The several steps of the process may be described in detail as follows: In treating the pyrites ores the ores are first pulverized and mixed with the sulphides or sulphate of soda, and the mixture is then subjected to a roasting heat. In practice, with every 100 parts of an ore containing, say, 40 per cent. of the base metals, the inventor would add about 80 parts of the sulphides of soda, or about 130 parts of the sulphate of soda; but these proportions vary widely with the quality of ore. A soluble compound is thus formed, when the sulphide used may be called a double sulphide of sodium and iron, and may be chemically expressed as $Na_2\ Fe_2\ S^4$. The formation of this compound may be facilitated if the sulphate is used by the use of a reducing flame, or by adding coal in small quantities to said mixture.

The soluble compound is next removed by leaching with water. The residue containing the gold is then fused with a polysulphide of an alkaline metal, such as sodium or potassium, thus forming in the latter case the aurosulphide of potassium, a soluble compound containing substantially all the gold in the ore, and finally the mass is treated with water to separate the aurosulphide of potassium from the residue in the form of a solution. As for the proportion of the polysulphide, enough is added to make a ball of the stuff when molten; that is, the liquid polysulphide makes a mud with the ore. More is used for a light ore than for a dense ore, and one-half the weight of the ore would be a fair proportion in ordinary cases. The process of chemical concentration or chemical separation of the base metals from the precious is thus completed, and the gold in the solution may be recovered by any of the well-known methods, such as by boiling or treatment by acids.

In treating the other divisions of ores, viz, those containing antimony or arsenic, the ore is pulverized and fused with an alkaline monosulphide, and then treated with water, thereby obtaining the sulphantimonite or the sulpharsenite of the alkaline metal in solution and leaving the ore concentrated. In these cases, to every 100 parts of an ore containing say, 50 per cent. of base metals, the inventor adds, say, from 60 to 80 parts of alkaline monosulphide; but, as before stated, circumstances would cause these proportions to be widely departed from in many instances, and they are only stated by way of illustration. From the residue the precious metals may be extracted by any suitable method, as by fusion with a polysulphide of an alkaline metal, which extracts the gold, and the silver may be extracted as sulphate by well-known processes which oxidize the sulphide already formed.

There is an English patent by Henderson something like this, but not exactly. Henderson first forms a regulus or matte of from 30 per cent. to 40 per cent. of copper, which is the usual initial step. He then fuses the matte and adds sulphate of sodium to take up the sulphide of gold; then casts in molds and leaches out the aurosulphide of sodium. In Mr. Thompson's process he forms no matte, but works the raw ore with monosulphide of sodium, or its equivalent, to extract the iron, antimony, and arsenic, and treats the iron deprived of these elements with a polysulphide of sodium or potassium, to cause the free gold to form an aurosulphide. Henderson nowhere alludes to the use of polysulphides, and this is an essential feature of this process.

NEW PROCESS OF AMALGAMATION.

[From the San Francisco Mining and Scientific Press.]

A new process of amalgamation lately patented is intended to extract or separate the precious metals—such as gold and silver—from ores containing tellurium and "base" metals, the invention consisting in certain combinations of devices which constitute a mixing apparatus, into which the materials hereinafter named are placed for the purpose of mixing them with and amalgamating the ores, and also in a process of amalgamating the ores after they have been mixed with chemicals and placed in the apparatus. There is an air-tight case having agitators on it, and steam pipes also, so that the contents may be heated by steam.

To carry out the process the ores are first heated to a cherry red heat in the usual manner and then ground in a mill to a fine powder, a quantity of which is placed in the apparatus, in which the ingredients are placed. Supposing the amount of ore thus placed to be a ton, then the inventor adds 2 pounds of powdered ferro-manganese, dry, which is to be thoroughly mixed with the ore, and enough water added to completely saturate the mass. Ten pounds of bichloride of mercury are then taken and dissolved in warm water and added to the saturated ore in the apparatus. About 2 pounds of carbonate of soda are then dissolved in water, and also added to the mass. After this has been done and the apparatus tightly closed, steam is admitted until the whole contents are heated to the desired temperature, when the revolving shaft and its agitators are put in motion, thoroughly mixing the pulp and chemicals in one mass, the chemicals being thus brought in contact with the particles of metal contained in the pulp. The iron contained in the powdered ferro-manganese is acted upon by the chlorine of the bichloride of mercury, causing the mercury to attack the precious metals contained in the powdered ores. By this means chloride of iron, metallic mercury, and amalgam of the precious metals are formed, and the loss caused by the flouring of the mercury avoided.

When the mass in the apparatus has become thoroughly mixed, and the pulp and chemicals brought into contact with the particles of metals contained in the pulp and properly amalgamated, the charge is drawn off or removed from the apparatus and the amalgam washed, collected, and retorted off in the usual manner.

By the ordinary methods of amalgamating gold and silver ores, whether in stamp-battery, arrastras, or pans, a large loss of quicksilver occurs, by reason of the flouring or granulation of this metal. These fine globules of mercury become coated with impurities, and so lose their power of cohesion, and while in this condition it is almost impossible for them to be brought together again in a mass. The solution of carbonate of soda is intended to remedy this flouring of mercury by cleansing the powdered ores and particles from impurities, thereby enabling the quicksilver to unite with the metal to form amalgam.

CRUSHING AND TREATING AURIFEROUS ORES.

[From the London Mining Journal.]

A series of general improvements in the construction and arrangement of machinery for treating auriferous and other ores has been invented by Mr. C. J. Appleby, of Cannon street. They consist of stamps, amalgamating boxes, buddles, &c. Assuming that two batteries, containing three stamps each, are to be used, he arranges a suitable foundation, preferably of timber pipes, at the upper part of the floor where the operations are to be conducted, and upon this foundation he arranges the two batteries of stamps in line with each other, but separated by a sufficient distance. The support which carries the batteries upon the piles or other foundation consists of beams or girders of iron plates and angle irons riveted or bolted together, and made in pieces of such size and weight that they can be readily transported. Upon the support so constructed (which may be covered with a floor of iron, wood, or other suitable material) he fixes strong vertical frames, also of iron plate and angle iron, supported by suitable struts, and having cross-beams similarly constructed, to which are bolted guides, preferably of wood, in which the upper ends of the stamp rods are guided, these rods being preferably cylindrical bars, so that they can turn round in the guides. Near the upper part of the framework described he bolts or otherwise fixes bearings in which revolves a horizontal shaft upon which are keyed cams or lifters by which the stamps are lifted. These cams are arranged so as to come into operation in succession, and they operate upon circular disks or lifting plates, fixed upon the stamp rods by screws and adjustable nuts, so that their position may be accurately adjusted.

Upon the floor or platform below and between the batteries of stamps he arranges a steam engine and boiler of any convenient form and design, and upon the driving shaft of such engines, or upon a shaft connected to it, he fixes a chain-wheel round which passes an endless chain, also passing round a corresponding chain-wheel above the shaft which carries the lifting cams. The lifting cams upon each battery of stamps can be connected with or disconnected from the shaft so actuated by means of a suitable clutch-box actuated by a handle below, so that either or both the batteries may be set in motion or stopped as desired. The cam shaft or the engine shaft may also be supplied with a crank or cranks actuating one or more pumps by which water is pumped up into a cistern at a sufficient height, whence it is brought down through pipes and admitted as required into the stamp-boxes into which the auriferous quartz is fed and pulverized. From the stamp-boxes the auriferous quartz, discharged through screens when sufficiently pulverized, passes together with the water through conducting chutes into amalgamating boxes placed at a lower level, but carried upon the same foundation and supports.

These amalgamating boxes are preferably of iron and rectangular in plan. The back and ends of the box are of considerable height, and in the ends guides are formed within which are adjusted at a short distance from and parallel with the back a plate or board, the lower end of which descends to within a short distance of the bottom of the box, dipping below the surface of mercury with which the bottom of the box is supplied. The pulverized quartz and water, therefore, admitted into the space between the back of the box, and the adjustable board or plate described descend through the mercury, up which they rise, part of the gold being detained and amalgamated with the mercury, and they then pass over the front edge of the box, which is a little above the surface of the mercury, and thence fall, if required, into a similar box where a further quantity of gold is detained, and whence if necessary they may again pass into similar boxes, or into chutes or troughs, which conduct them into buddles or concentrating apparatus thus arranged and actuated. He prefers to arrange one buddle to each battery of stamps at a lower level than the amalgamating boxes described and supported upon timber or other foundation. Each buddle is complete in itself, and consists of a horizontal pan or vessel of suitable diameter constructed of iron plates riveted or bolted together. Transversely across the top of each buddle a framework of iron plate and angle-irons is arranged, which carries bearings in which revolves a horizontal shaft parallel to the engine shaft, and driven at a suitable speed from the latter by means of chain-wheels and an endless chain. This shaft drives by means of beveled toothed wheels a vertical shaft revolving in the center of each buddle in bearings in the bottom of the buddle, and in the transverse frame above, and each transverse shaft carries a horizontal revolving frame which revolves above the buddle, and is provided with adjustable rakes, scrapers, brushes, or cloths, by which the surface of the auriferous sand which is admitted through a trough to the center of the buddle from the amalgamating boxes already described is smoothed and made uniform and even.

The particles of gold being heavier, settle down near the center of the buddle, whilst the lighter and poorer sand fills its outer part, the water eventually flowing away, and being made to pass, if necessary, through settling pits, in which any auriferous quartz still remaining in suspension is deposited. When the buddle is full the revolutions of the vertical central shaft is stopped by means of a clutch-box upon the transverse revolving shaft, which drives it, and auriferous sand, concentrated and enriched, as described, is removed, and the gold extracted by amalgamation, or other well-known means. He prefers to coat the interior surfaces of amalgamating boxes and of the buddles or concentrating apparatus with enamel, in order to prevent injurious action in the presence of the mercury. Buddles constructed and arranged in the method described are self-contained, and, consequently, are very easily fixed in their places, and removed as may be desired. And by the method of construction of the several parts of the entire apparatus, and by the method of arrangement described, in which the whole series of processes is continuous, the entire mechanism being supported and adjusted by and at the same time forming part of the framework which carries it, great economy both of construction and in fixing and removing the machinery or apparatus, as well as in working it, is effected.

EXTRACTING GOLD FROM SILICATES.

[From the London Mining Journal.]

The general opinion entertained that silicates and aluminates of gold do not exist has not prevented inventors from attempting to extract them, and as all discoveries must have some date associated with their recognition, it is scarcely safe to place the negative evidence given by chemists against the positive results which certain inventors allege that they have obtained. If the discovery of these salts of gold have really been made there is justification for the supposition that it will fight its way like the electric light and electric power inventions have done, and it is to be hoped that the inventors will derive their fair share of the profits to be derived from the extraction of precious or other metals from refuse which is not at present acknowledged to contain them in sufficient quantity to make their separation remunerative.

Among those who claim to be at present obtaining gold from its silicates is Mr. J. P. Kagenbusch, of Cornwall Road, Lambeth, so that the specification of his most recent patent will be of general interest; he states that the object of his invention is the extraction and separation of precious and other metals in an improved and economical manner from siliceous, aluminous, and other substances, and in the application of the same process obtaining and manufacturing aluminium bronze from the aluminous residues produced therefrom. He first pulverizes and then mixes them with charcoal, the time required for roasting being regulated by the component parts contained in the minerals being treated. When the roasting is completed the mineral is thrown red-hot into water, by preference cold, well stirred and washed clean. The minerals are then dried and mixed with the following fluxes for smelting: Soda ash (carbonate of soda), potash (carbonate of potash), borax, and other fluxes used for smelting minerals, such as lime, salt, rock salt, fluor-spar, &c., or a mixture of the same, always having a certain quantity of soda ash or potash in the mixture of the fluxes used, to bring the silica alumina chemically combined with the metals into a soluble state.

When thoroughly mixed and put by for some days the mass is put in crucibles or furnaces, and white heat applied thereto; it will soon be found in a melted condition. The length of time taken for smelting and the kind and quantity of the fluxes to be used would be estimated and fixed according to the component parts of the minerals to be smelted. By these means the greater part of the metals in the substances are then chemically separated from the siliceous, aluminous, and other earthy and injurious substances.

When the smelting is finished he adds zinc and copper to the melted mass, and stirs it up well with a view of causing a development of electricity, which facilitates a further and complete separation of the metals from the earthy substances. The smelting may be carried on in crucibles or suitable furnaces. The metals are after the smelting separated mechanically from the slag or dross by washing, and then purified in the usual way. If the slag or dross after the metal has been extracted contains any alumina he adds thereto a certain quantity of metallic granulated copper, the quantity being regulated by the amount of alumina ascertained to be in the slag, and again brings it to a melted condition, stirring it from time to time. The copper will then combine with the metal aluminium in the alumina after being in a melted condition for an hour more or less, the mass being stirred up again several times, and thereby he produces aluminium bronze of better quality than any at present in the market, as it takes up all the gold, platinum and silver left in the slag or dross by the first process. The metal is then mechanically separated from the dross, and purified in the usual manner.

PURIFICATION OF PRECIPITATED COPPER.

[From the London Mining Journal.]

In the various processes for the extraction of copper by what is known as the humid method, the copper is usually precipitated by immersing in the cupreous solution scrap iron, sponge iron, or cast iron. The precipitated copper thus thrown down is in almost all cases contaminated by the presence of varying quantities of arsenical compounds. In the subsequent smelting of such precipitated copper the removal of the arsenical compounds is accomplished with difficulty, and an inferior quality of copper consequently results. The invention of Mr. Frederic Claudet, of Coleman street, has for its object the removal of the arsenical compounds from the precipitated copper previously to smelting the same, and the consequent more ready production of ingot or cake copper free from arsenic. For this purpose he either treats the precipitated copper when in the wet state or condition as obtained from the precipitating vats, or, when it exists in a partially or completely dried state or condition, with a solution of caustic or carbonated alkali, or with mixtures of the same. He prefers for this purpose to employ a solution of caustic soda, or a solution of carbonate of soda, or a mixture of the same, which solutions may be employed either at an ordinary or at an elevated temperature. It will, however, be understood that the corresponding alkaline potassium compounds or mixtures of the same may also be employed. By this means the arsenical compounds existing in the precipitated copper are converted into soluble arsenical salts, either of soda or potash, which are removed from the precipitated copper by the alkaline solution, and by subsequent washing, either with hot or with cold water.

In some cases it is preferable to moisten the precipitated copper to be purified with a strong solution of a caustic alkali, or of an alkaline carbonate, or of a mixture of the two, as hereinbefore mentioned, and after drying the mass to subject it to a suitable heat in a muffle or other furnace. The arsenical compounds thus formed are consequently removed in the form of soluble arsenical salts, either of soda or of potash, by lixiviating the heated mixture with water, by preference with water at an elevated temperature. The proportions in which the caustic or carbonated alkalies are to be employed will be dependent upon the amount of the arsenical compounds existing in the precipitated copper, but he has found that in treating ordinary English precipitate made from Spanish or Portuguese pyrites, 3 to 5 per cent. of alkali, or its equivalent, gives good results. Other proportions may, however, be adopted, his object being to convert the arsenical compounds existing in the precipitated copper into easily soluble salts, in order that they may be removed, and that the copper may be obtained in a purer condition.

WHAT A LODE IS.

A contributor to the London Mining Journal freely translates from German sources the following clear statement of the distinctive features of a lode:

Lodes are plane bodies which traverse rock formations, but which were not formed at the same time, but at a later period than those formations.

The difference between lodes and beds consists in the dissimilarity of their formation or their age. A bed is also a plane body, but it is interstratified, and of the same age as the inclosing strata. A lode, however, whether occurring in stratified or unstratified rocks, is always younger than the strata it traverses, because later formed. In many cases lodes have been formed by the occurrence of fissures which have subsequently been filled up. It may indeed be said that in most cases mineral veins have been found in this way. According to the filling matter they are termed dikes or lodes. Dikes are filled with rocks which have no particular value, as basalt, trachyte, greenstone, porphyry, and granite, which, as is known in many cases, have come in a molten state from the interior of the earth. They vary in size, from the thickness of the finger to many hundreds of meters. Lodes consist of quartz, calcspar, fluorspar, heavy spar (barytes), feldspar, &c., and when they contain one or more ores they are known as ore lodes, which, as the repositories of useful minerals, are to the miner of the greatest importance. Like beds, lodes have a strike and a dip (underlie). Their length is often considerable; some are known many miles long; their depth is in most cases unknown. The coming out of the vein at surface is termed its outcrop. The rock overlying the lode is called the hanging wall, the underlying rock the foot wall. The size is the vertical distance between the two walls. The underlie is various, and sometimes the vein is perpendicular to the horizon, in which case it cannot be determined which is the hanging or which the foot wall. Lodes have, however, more frequently a considerable than a small underlie. As lodes are crevices or fissures subsequently filled up, so the fissures have their peculiarities. Generally besides the main fissure subordinate ones are found to branch off from it, and these also are afterwards filled up; they are known as feeders or branches. All lodes have such feeders, and contain angular pieces of the country rock, a feature never observable in beds. Lodes have a varying size, depending upon the original width of the fissure. When the fissure is formed one side often slides along the other, mostly the hanging upon the foot wall, resulting in the sides being polished or rubbed smooth, and sometimes striated; these appearances are termed slickensides. A lode may come to an end by wedging out, as when it dwindles down smaller and smaller until it becomes a mere division in the rock, or, after being nipped, it may again open out and continue its course. Lodes, like beds, may be cut off and displaced by heaves or slides; the extent of the heave or displacement may be very small or very considerable. Fissures occur most readily where the rock is most yielding or most easily ruptured; many stratified rocks rupture most readily in their plane of bedding, and in such cases the lode is found parallel with the strata. It is then called a flat vein (lager gang—bed lode).

NEW METHOD OF SEPARATING MINERALS.

[From the San Francisco Mining and Scientific Press.]

Mr. T. Buettgenbach contributes to the Berg- und Hüttenmänische Zeitung the following:

The separation of intimately intermixed minerals from each other has hitherto been effected mainly by taking advantage of differences in density, structure, or capacity for being rendered magnetic by calcination, while no use has been made of the striking properties evinced in differences of specific cohesive strength. The separation of minerals of unequal hardness, and by reason of their greater or less susceptibility to break down into fragments of different sizes, is not possible with the ordinary crushing or stamping mill; but it is different when the mass is thrown violently against a hard resisting surface, in which case, if the velocity is properly proportioned, only the more brittle substances are broken. In order to obtain a proper separation of iron pyrites and zinc blende, the author has been led to experiment on the use of Vapart's centrifugal breaker, not only as a crusher, but as a separating machine. When this apparatus is driven at 800 revolutions per minute, lumps of iron pyrites of 20 to 25 millimeters diameter are reduced partly to dust and partly to grains of 1 to 1½ millimeters; but when the velocity is reduced to 400 revolutions they are scarcely touched. Blende, which is of inferior hardness, is reduced to the finest flue stuff at 800 revolutions, while at 400 it leaves the apparatus partly as dust and partly as grains of 0.5 to 3.0 millimeters in diameter. If, therefore, a mixture of the two minerals is treated at the lower speed of 400 revolutions per minute, the pyrites are almost entirely unaltered, while the blende, being very finely reduced, may be separated by a simple sifting process. In order to make the process continuous in action, the crushed ore is passed through a hopper into a drum sieve making $9\frac{2}{10}$ revolutions to every 100 of the mill, and divided into three parts with holes of 1, 2, and 3 millimeters respectively. The coarser stuff passes into a second drum with two divisions, having holes of 6 and 8 millimeters respectively, which is driven at 8 revolutions per 100 of those of the crusher. The size of the sieve holes depends upon that of the particles operated on, and it is important that this shall be as nearly uniform as possible. The operation may be carried on wet or dry, but in the latter case it is essential that the material shall be as free from moisture as possible, as the powder, if damp (with about 4 per cent. of water), binds, and easily stops up the holes in the sieves. The dust is also a very great inconvenience, which, however, may be remedied by the use of a small jet of water. The separation of the two minerals is not completely effected, as the angles of the grains of pyrites are apt to break off, even at moderate speeds of the machine, and to become mixed with the fine blende; but it is sufficient for ordinary commercial purposes. The economic value is shown by the following calculation: Mixed ores with equal contents of blende and pyrites are worth at the utmost about 10s. per ton, and are not easily disposed of at that price; but when subjected to the treatment described above the products are 11 cwt. of pyrites, with 5 per cent. of blende, worth 9*s.* 6*d.*, and 9 cwt. of blende, worth 31*s.* 6*d.*, or a total of 41*s.* for the separated products. Taking the cost of the raw material at 10*s.*, and the working cost at 9*d.*, the profit on the process appears to be 30*s.* 3*d.* per ton of stuff treated. The amount of material that can be crushed in a Vapart mill is about 5 tons per hour passed once through, so that a single apparatus will be sufficient for even a very productive mine, as mixed ore of this kind never forms more than a comparatively small portion of the total produce.

WORKING AURIFEROUS SILVER ORES.

[From the San Francisco Mining and Scientific Press.]

If rich auriferous silver ores, in which the percentage of gold is high, almost equal to that in silver, should be subjected to a chlorodizing roasting, then impregnated with chlorine gas, leached with water, for the purpose of extracting the gold, and finally leached with a hyposulphite of lime for the silver, it would, although a high percentage of silver might be extracted, result in a yield of gold that would hardly amount to much more than about 50 per cent., more or less. The reason is not easily explained; the gold may be influenced somehow by the base metal chlorides during the roasting, which prevents the gold from being attacked by the chlorine gas. On the other hand, if the base metal chlorides and the chloride of silver are extracted previous to the impregnation with chlorine, both metals—silver and gold—can be got out very close. On this fact is based Mr. Ottokar Hoffman's gold and silver chlorination process, by which he successfully treated the gold and silver bearing sulphurets of the Tarshish mine of the Colorado No. 2 Company, at Monitor, Alpine County, in this State.

Experimental works are now being put up at Saint Louis to carry out this process, under the personal supervision of Mr. Hoffman, who has recently gone there. The mine which produced the ore to be worked is the "Mary Murphy," in Colorado, and the Saint Louis company owning it have been unable to make it pay on account of the low grade of the ore and its peculiarities. Hearing of the Hoffman process, some of the ore was sent to San Francisco for him to work. The result was so satisfactory that he was engaged to come to Saint Louis and try the process there. We had an interview with Mr. Hoffman before he left, and he expressed himself as perfectly able to work the class of ores referred to with profit. The ore is pretty low grade and base, containing a good deal of zinc blende and galena. It yields both gold and silver. If the process is satisfactorily worked in Saint Louis extensive works will be put up there. The ore will probably be concentrated in Frue machines at the mine and the concentrates shipped. Some description of the process will interest our readers.

The concentrated sulphurets are subjected to a chloridizing roasting in a reverbaratory furnace. These furnaces, although old-fashioned stirring furnaces, are considered by Mr. Hoffman preferable for this class of ores to any mechanical furnace in use, especially to the continuous discharging ones. Those concentrated sulphurets require a very perfect roasting, and he claims that the furnaces with continuous discharge do not give time enough for very highly sulphureted ore to become thoroughly desulphurized. Such high-grade ores require close attention, and the process must be under perfect control of the roaster. However, it does not take near as much time as required by Plattner's gold chlorination.

After the ore has been roasted, it is spread on the cooling floor and sifted, when cool, through a sieve of ten to fourteen meshes to the running inch. The sulphurets are heavy enough, after roasting, to make very little dust during the sifting, so that the inconvenient moistening can be obviated. The lumps are saved till a larger amount accumulates; they are then pulverized in a dry battery and slightly roasted.

The roasted and sifted ore is charged into tanks with filter bottoms, in quantities from 2½ to 3 tons, and leached with water to extract all soluble base chlorides. The water, if saturated with those base chlorides and some salt, of which generally some is left in the ore undecomposed after roasting, acts on the chlorides of silver like a concentrated brine, dissolving the same. To prevent the escape of this dissolved part of silver, Hoffmann does not admit the water from above the ore, as is usually done, but from the filter bottom, which, by means of a slight pressure, is forced to ascend through the ore to the top of the vat. In this way the concentrated solution accumulates above the ore, and in diluting the same by a stream of water, and permitting the solution to flow out through the filter bottom, the chloride of silver is precipitated on and through the ore, which is then extracted with the balance of the silver. The operation affects the fineness of the bullion somewhat if there is a considerable amount of lead in the ore, but not materially. The leaching of the silver is done, as usual, by leaching the ore with a solution of hyposulphide of lime and precipitating the silver with polysulphide of calcium.

After the silver has been extracted the solution of the hyposulphite is allowed to run out till it disappears under the surface of the ore, when clear water is introduced again in order to displace all solution. The delivered ore is then removed from the tank to a dry kiln, where it is left for a time till the surplus water has evaporated. After this it is charged back into the tank still moist. This second handling and drying cannot be avoided, as the ore after leaching is too wet to permit of a free passage of the chlorine gas; but if the works are arranged properly this partial drying causes neither much delay nor much expense.

The gold in the ore is now in metallic condition, and very bright and clean, permitting a very close extraction. The rim of the tank is provided with a groove, which is open toward the inside, 2½ inches deep and 1½ inches wide. In this groove fits the cover of the tank, leaving, however, a play of one-eighth of an inch around the circumference. The cover being made of inch boards, the staves of the tank will project 1½ inches above the cover. This arrangement serves in two ways—first, it facilitates the operation to make the cover air-tight with clay; and second, it enables the chlorination to keep a sheet of water 1 inch thick on the top of the cover, thus making it perfectly air-tight and preventing the escape of gas into the working room during the time of charging the tank with water for the purpose of extracting the gold. The cover is furthermore provided with two pieces of 1¼-inch gas-pipe, 6 inches long, and a square opening 6 by 6 inches. During the time of the impregnation of the ore with gas these pipes are closed with balls of clay. As soon as the charge is ready for the extraction of the gold, these balls are removed, and one of the pipes is connected with the hose of the water tank, while the other, by means of the hose, either with another tank already prepared for chloridizing, or with the ash-pit of the roasting furnace. This is done to utilize the surplus of chlorine gas and to protect the workmen from the very injurious effects of the same. Care must be taken to have sacks placed on the top of the ore right under the water pipe, and kept in place by two bricks to prevent the stream of water working into the ore. The square opening serves for examining the progress of the gas in the ore, and can be closed air-tight by a good-fitting cover and clay.

The chlorine gas is generated in a leaden gas generator, which is not heated, as usual, by direct application of fire, but by steam. For this purpose the generator is placed in a tight-fitting box, leaving a space of 2 inches around the side and the bottom for the circulation of steam. The rim and cover are kept outside the box. The steam enters on one side through a half-inch pipe, while the other side of the box is provided with a 1-inch exhaust pipe and an outlet for the water.

Whatever steam can be had in chlorination works, this arrangement will prove very convenient and useful. The operator has the temperature entirely under his control. The least turn on the valve increases or decreases the heat, and, of course, regulates the generation of gas. The discharge pipe of the generator projects a short way out of the box. On this pipe is fastened a piece of hose about 2 feet long, which can be closed with a thumb-screw clamp. The hose lies in a covered trough, which leads outside of the gas-house. In discharging the generator, a small stream of water is permitted to flow through the funnel into the generator, by which the gas is forced through its usual outlet into one of the tanks. When the generator is filled the stirrer is set in motion and the thumb-screw on the hose loosened. In this way the generator can be discharged without molesting or injuring the men. The cover of the generator is closed tightly with clay, and only removed in case of repair. The gas is conducted through a leaden pipe, intersected with rubber hose. Each tank is connected with the main pipe, and can be disconnected by the use of the thumb-screw clamp. The pipe through which the gas enters the tank is independent from that one through which the solution discharges. It is placed higher, and as close to the false bottom as possible. After the gas has been the proper time in contact with the ores, the gold is extracted by water and precipitated in the usual way with sulphate of iron. The gold obtained is of extreme fineness, varying from .970 to .987.

In treating very rich ores, containing, say, $700 to $800 gold per ton, the solution carrying out the gold is of a very lustrous yellow color, and the precipitated gold accumulates on the bottom in spongy lumps of great specific gravity, some of them showing scales of bright gold, which, under the microscope, might prove to be crystallized gold. There is but very little more time used in leaching rich gold ore than poor.

If the ore is copperous, considerable copper will be carried out with the gold solution, coloring the same green. In order to save the copper, the solution, after the gold has been precipitated and settled. is decanted into the copper tanks; but before doing this it is advisable to draw the solution first into a second gold tank, in order to catch the gold which should accidentally be carried off with the stream, and to leave it there for some time to let the gold settle again.

CHLORINATION.

[From the San Francisco Mining and Scientific Press.]

It has been found by experience, after many exhaustive attempts in various parts of the world to work them otherwise, that the easiest, cleanest, and most complete method of getting the gold out of "sulphurets," as pyrites and galena in quartz are commonly called, is by using chlorine and moisture.

So true is this, and so universally known is it, that I take it for granted no one at all conversant with metallurgical processes will for a moment gainsay it. Chlorine seems to be the one element known to us that will at once dissolve and disassociate quickly and cheaply fine particles of gold out of their mixture with oxides of the metals commonly found in sulphurets, namely, iron, lead, copper, antimony, zinc, and aluminum.

To utilize this property of chlorine was the aim of Plattner, the grand success of Deetkin, and the final improvement of Mears.

Plattner first successfully applied chlorine to extract gold from arsenide waste in Reichenstein, Silesia, in 1851.

His discovery was speedily sought to be modified or improved by Calvert, who used "nascent chlorine"; Kiss, with another modification; Patera, using a solution of salt saturated with chlorine; Rosner, who roasted with salt, and used a hot solution of salt for dissolving; and several other men, other modifications.

As all these departed from the simple, direct application of the gas to the roasted and moistened pulp mass, they seem to have departed from a practical success, and but little is now heard of them.

Deetkin's great success was in so coating wooden vessels that they resisted the dissolving action of chlorine. He thus rendered it feasible to establish complete plants for carrying out the reactions at a moderate outlay of money, by furnishing cheap containers and conduits, dispensing with the porcelain and glass jars, vats, and tubes of the German works.

Mears's improvement consists chiefly in condensing the gas and forcing it into the pulp while it is in a state of great agitation or commotion, whereby the time required to carry out the phenomenon of dissolving gold is reduced from one twenty-fourth to one forty-eighth.

The Plattner process, as improved by Deetkin, described in general terms, is performed as follows:

(1.) The auriferous concentrates having been perfectly oxidized, are moistened with water and put lightly, by means of a sieve, into a wooden vat, coated with tar and rosin, and having a perforated false bottom upon which a filter is made, for which there are numerous ways. When filled, a close-fitting cover is placed on top, and (2) chlorine gas, produced by decomposing salt, and peroxide of manganese with sulphuric acid is introduced between the false and true bottoms, and made to permeate upwards through the ore mass. After the expiration of from fifteen to forty-eight hours the gas is found to appear abundantly on the ore mass, and is then shut off, and the vat allowed to remain a few hours under the influence of the gas. The cover being removed, pure water is added to fill the vat even with the top surface of the ore; the fine particles of gold, under the action of chlorine, have changed from metal to a soluble terchloride, and in this condition it is drawn off or leached out with water, fresh being added until a test shows no trace of gold. A prepared solution of sulphate of iron—the usual precipitant—is carefully added to this drawn-off solution, and the gold thrown down as a black or brownish precipitate; this is then gathered, washed, and melted into ingots of nearly pure gold.

Such is the general outline of the Plattner process. Of course the capacity of a vat is limited, much water used, and the working of each charge consumes from twenty to seventy-two hours. Hence, in case of large operations—many tons daily—the number of vats needed, the amount of water to be handled, would demand an immense space and a prodigiously cumbersome establishment.

These considerations, in addition to the dependence upon an expensive roast, have restricted the use of an agent for the extraction of gold, in all other respects unrivaled.

J. Howell Mears, M. D., of Philadelphia, experimenting, some four years ago, upon roasted pyrites, with small apparatus in his laboratory at home, had an accident happen by one of the outlet pipes from the vessel in which he was exposing some ore to the action of chlorine getting stopped, or clogged, which stoppage caused a pressure of gas in the vessel and an explosion, whereby the whole thing was shattered.

As the exposure of pulp to gas had been for a few minutes only, he thought to try the thing over again, having for that purpose gathered up the sand, broken glass, and *débris;* but, as it was inconvenient from lack of apparatus to expose the pulp again immediately, he tested the pulp to ascertain if any solution had taken place, and to his astonishment found that the action had been about as thorough and complete as he was in the habit of finding it after hours of simply passing the gas into and through the moistened pulp.

Here was a discovery, and on it is based the now perfect process called after the distinguished discoverer; a process, however, which, like the Plattner, has been perfected and made practical by the ingenuity and thought of many minds besides that of the original discoverer.

In the Mears process the roasted ore is moistened with a small amount of water (about two-thirds of what is required in the other process), then charged into an iron lead-lined barrel which revolves, and into which gas is forced, and thus constantly stirs and tumbles the ore. Several advantages are gained by this mechanical attrition:

(1.) The ore is kept lively and every particle of it exposed to the action of the chlorine.

(2.) If there be any large, coarse grains of gold present, instead of a coating of chloride of gold forming around them and thereby preventing further action of the gas upon the gold grain, as is inevitably the case where the pulp lies still in a vat, the chloride of gold, as soon and as constantly as it is formed, is removed, thus keeping up a continuous action of the gas upon the gold and consequently rendering the dissolving of a grain of gold as certain and, within reasonable limits, as speedy as if all the gold were of the finest powder. This is a very important consideration, for I am convinced that in many cases where sulphurets are treated by the Plattner process and poor results or high tailing assays obtained, it is because the gold particles were so coarse as not to be entirely dissolved during the time allowed for chlorination; *i. e.*, that the solution was hindered by the protecting coat of terchloride of gold inclosing the gold particles and stopping further solution.

(3.) In California a good deal of the gold in sulphurets, or, rather, many kinds of sulphurets carrying gold and silver, have the gold so highly alloyed with silver that it is not easily dissolved by chlorine. I have found that it is almost impossible to dissolve this alloy of gold and silver contained in some of our sulphurets—in even nitro-muriatic acid—unless the coating formed on the gold particles is constantly removed by rubbing. I am of the opinion at present that part of the silver becomes converted into a chloride, coats the particles of gold, and retards further action of the chlorine. This phenomenon occurs only in an alloy presenting a certain proportion of silver to gold. It is not universal, but it is common. Roasted sulphurets carrying this kind of gold alloy, in a revolving barrel, treated with chlorine, present no difficulties, because by the mechanical attrition this coating is scoured off by the sharp grains of sand as fast as it is formed, in a similar manner to the terchloride of gold previously spoken of.

The above advantages are undoubtedly accomplished by attrition, and are easily and speedily effected in this revolving barrel.

The pressure of gas which is applied while the barrel is revolving is gained by pumping the gas, by means of a peculiarly constructed and very simple pump, directly in through one trunnion of the barrel. The effect of pressure is also to hasten the action.

When the charge has been revolved long enough, the barrel is filled with water, thus liquefying the pulp, the bung is taken off, and the contents discharged into a filtering vat, through which the solution runs into precipitating tubs, where the gold is thrown down in the same manner as in the Plattner process. Or else the solution is run through tanks packed with pulverized charcoal, which, of itself, precipitates and catches all the gold from the solution, and, after a time, the charcoal is burned and the gold collected. I prefer a precipitation by a freshly prepared solution of sulphate of iron or ferrous sulphate.

Several plants embodying the Mears process are in successful operation throughout the country, notably at the Bunker Hill mine in Amador County, California.

If there is any one thing sure in the metallurgy of the future in California, it is that more attention will be given to the concentration and chlorination of the gold-bearing sulphurets which are scattered in such profusion throughout our gold belts, for undoubtedly these sulphurets are the immense reservoirs of gold, and are so even in their quality and richness as to invite treatment at the hands of capital, when sure methods are discovered and perfected. It is, therefore, well and in the interests of this State that methods should be improved, and when improved, described and made known through all mediums at command, particularly through the way of such a publication as the Press, and I have, therefore, taken some pains to discuss what I know to be a perfect method of extracting gold from auriferous pyrites, or sulphurets, as they are commonly known here.

THE BLATCHLY CONCENTRATOR.

[From the San Francisco Mining and Scientific Press.]

This is an invention of Dr. Blatchly, of San Francisco, and the late Guido Kustel. It is a modification of the Rittenger percussion table. The distinguishing feature of the Rittenger table is the application of percussion to the side, drawing the heavy materials sidewise out of the stream of pulp instead of an end bump drawing them against the stream, as in the ordinary percussion table. It also allows a more extended classification of the materials, from the lightest to the heaviest. and a number of different grades can be produced at one operation, which is impossible with an end-bump table, which makes only two—waste, and one grade of concentrates.

The improvements consist in arranging the tables in pairs, to strike against each other, and as action and reaction are equal, only one half of the power is required to produce the same effect. It prevents the creeping of the bumper, which, in process of time, will recede from the table, and it neutralizes the vibration of the frame; also, in mounting the tables, one pair above another, in a frame allowing several pairs to be operated by the same cam shaft, without separate shafts and pulleys. In moving the tables use rollers, causing them to move in parallel planes instead of in arcs of circles. Also, an improved sizing box, and a surface of the table partly smooth and partly corrugated, greatly increasing their concentrating capacity; and in an elevator of sufficient power to elevate all the pulp from a five-stamp battery, and the middlings from the concentrator, besides sundry minor improvements.

It is composed of six tables, in pairs, one above another, supported by a massive frame. These tables are placed on an incline of from 1½° to 6°, according to the nature of the ore and the amount of water used on them. The coarser the ore and the less the water, the more must be the inclination. A lateral motion is imparted by means of cams on a vertical shaft, which passes between each pair of tables. The cams operate on tappets fastened to the under side of the tables, throwing them apart, when two strong spiral springs throw them together with a sharp shock or bump, giving to the table a shaking and percussive motion.

Bumpers extend the whole length of the inside of the tables, except a small space in the center, where the cam shaft passes between them.

The rollers supporting the tables are toothed, and oscillate on a toothed track which holds them in place. The tracks are adjustable, allowing the inclination of the tables to be varied as required. The surface of the tables is composed of rubber, partly smooth and partly corrugated, the corrugations extending crosswise. The motion of the tables causes the heaviest particles to settle in the bottoms of the corrugations, and the percussion draws them across on to the smooth rubber, while the lighter materials flow over the corrugations and pass off as waste.

Spouts extending across the head of the tables, with numerous small holes, supply clear water. By closing or opening the holes the flow of water is regulated and applied to any part of the table. Movable boxes rest on the spouts and deliver the pulp on the outside corners of the tables. At the lower end of the tables are movable dividers pivoted at their lower ends, by which the stream of pulp is directed into its appropriate channel. On the top is a sizing bar which sizes the pulp into three different grades of fineness and takes off any surplus water.

An elevator is used to take up the middlings, and if it is required to set the concentrator above the battery it takes the pulp as it comes from the battery. The operation is as follows: The pulp is delivered to the elevator and passes into the sizing bar where it is sized into three grades of fineness, the coarsest going to the upper pair of tables, which are set at a greater inclination than those below, which receive the finer grades—the finest going into the lowest pair, which have the least inclination.

The pulp is applied to the outside of the tables on the corrugated rubber, the heaviest particles settling into it. The lighter particles and water are scarcely diverted from a straight course by the percussion, and pass off as waste, while the heavier ones are drawn toward the inside, according to their various specific gravities, and exposed to the action of the clear water, which washes away the impurities, and the clean concentrates pass through the pipes in the inside corner into a tank. Between the concentrates and the waste is what is called the middlings, containing some valuable and some worthless materials; this passes to the elevator, and is resized and reworked.

Some ores contain gold which is coated, and which will not amalgamate. In such cases, another division is added to the inside of the table, and the gold caught by itself.

This machine is adapted to treating fine sands, or slimes, or the tailings from a gold quartz mill, and one machine will work all the pulp from a five-stamp battery. It is about 6 feet by seven at its base, and 8 feet high. It can be seen at the Golden State and Miners' Iron Works, 237 First street.

One of these machines, of a larger size, taking the pulp from the stamps, ran in the Knox & Osborne mine, near Mokelumne Hill, for fourteen months.

PLACING FRUE CONCENTRATORS.

[From the San Francisco Mining and Scientific Press.]

The use of a revolving belt, either plain or with riffles or buckets, as a carrier for various material is not of recent date, but the application of a lateral shaking motion to such a belt—a motion closely resembling that given to a shovel in vanning by hand—is a novelty, and constitutes the essential element of the success of the Frue concentrator. A revolving belt of canvas with a lateral or end *blow* has been used in Germany and England and also in the States, and, though pretty good results were obtained with it, the difficulty of making the belts last proved too great. The *side shake* is as great an improvement over the *blow* as the perfect rubber belt, with permanent high flanges, is superior to the rough, costly, short-lived canvas belt. The Frue concentrator, as now made, though so simple in its appearance and action, is the result of no small expenditure of thought and time, and has been evolved only after a process of variation and selection extending over a number of years.

Several hundred of these machines are now running in the mining regions on this coast, and doing good work. Perhaps the best recommendation that could be given for them lies in the fact that, in many places where they have been in use for some time, more of the same pattern have been ordered.

So well known are the machines that no description of this concentrator or operation is necessary.

There is sometimes some doubt as to the best place to put the concentrator. The Frue concentrator should be placed with its foot towards the battery in a gold mill, where only one is used for five stamps; where two are used the head of the second one is placed towards the head of the first.

The counter-shaft to drive the Frue concentrators is placed parallel with the cam-shaft and main-line shaft of the mill. It is therefore placed at right angles to the crank-shaft and pulley of the concentrator itself. This necessitates the use of a quarter-twist belt. The proper placing of this counter-shaft and pulley is very important; for, with it properly set, the quarter-twist belt runs as well, as true, and with as little wear as if it were a straight belt, while if not properly set it will run off the pulley. This placing of counter-shaft and pulley for quarter-twist belt does not seem to be generally understood even by good mechanics. The rule is as follows:

"In placing the counter-shaft and its pulley, the pulley should be set so that the side from which the belt leaves it is in line with the square of the crank-shaft of the concentrator at that point."

It will be borne in mind that the crank-shaft is not horizontal.

THE PACIFIC GALENA-SILVER SMELTER.

[From the San Francisco Mining and Scientific Press.]

This smelter, as now constructed, embodies the results of more than twenty years' experience, observation, and study, as to the requirements of this method of treating ores. The remarkable results obtained from it regarding capacity for continuous work, minimum cost of repairs, and economic production of bullion, fairly entitle it to be considered as the most improved type of smelter now made.

The special advantages claimed for this smelter may be enumerated as follows: The water-jacket is made in sections—two or four, according to size—so that any of them can be removed without disturbance to the rest of the furnace, making all parts accessible for cleaning out, and repairs when necessary. With a large plant, extra sections may be provided, which can be quickly put in place in case of leakage or accident to one of them, thus securing against any loss of time in running.

The jacket is made of wrought iron, and can be easily repaired in case of leakage. Cast-iron jackets are heavy for freighting, liable to crack, and are then worthless. The whole structure is made complete at the shop, constructed mostly of wrought iron, to insure strength and lightness, and in sections to facilitate transportation and setting up, no brickwork being required, except for crucible and two courses on top of jacket, making the cost of erection less than half that of any other style of smelter.

Patent circulation plates are put into each section of jacket in such a way as to secure a rapid circulation of water. This prevents any scale from forming on the inner surfaces of the plates from the action of mineralized water, reduces the temperature, and prevents the overheating and burning out so common in all other jackets.

Experience has shown this to be the most valuable improvement ever made in water-jacket smelters, adding at least two or three times to the effective wear and service of the jacket, besides saving in loss of time and cost of repair. The use of these plates also saves at least one-half the water required in other jackets—a point of much importance in localities where water is scarce.

A boiler-iron foundation and curb are provided, inside of which the whole structure is built. This is to prevent any escape of bullion in case of leakage from the crucible, which often occurs, involving serious loss without any means of detecting it. Instances have come to our knowledge where large sums have been saved in this way.

The lead-well is located outside the jacket, into which the metal is run and kept hot by a small fire, while the dross and other impurities can be skimmed off before being ladled into molds. The tuyeres are made in the jacket, and, being surrounded with water in active circulation, never burn out. The jackets are rectangular in form with round ends, giving no corners for the accumulation of slag, which tends to bridge the ore and prevent it from coming in contact with the blast.

The arrangement of the tuyeres and the distribution of the blast are such as to avoid dead centers, secure perfect combustion and the most economical results from fuel. In the larger sizes both ends are provided with charging doors and slag discharges.

These smelters are made of 10, 20, 30, and 40 tons' capacity, the larger sizes being recommended as the more desirable where the ore development will warrant it, as they can be run more economically, both as regards fuel and attendance, than the smaller.

When larger capacity is wanted, the manufacturers recommend duplicating the 40-ton stack rather than making them larger, though they make them of 50 and 60 tons' capacity when desired. They are adapted to any class of galena ores, whether free or base, the successful working of which being merely a matter of fluxing.

With single stacks, separate engines are provided for blower and crusher, to insure a steady blast. In larger plants, a Wheelock automatic cut-off engine is recommended, with power of all requirements. Downcasts made with steam or water jets, to condense the vapors and save the fine dust, are furnished when desired. The great drawback to the successful treatment of ores by the smelting process, it is well known, has been the want of a smelter that could be run continuously without stopping frequently for repairs, two stacks being ordinarily required to keep one in constant blast. This difficulty has been overcome in this smelter, which, with the care ordinarily given a steam boiler, can be run as long and with as little loss of time or expense for repairs.

The record shown by this furnace is such as to satisfy any one interested of the claim of superiority here made. The success of these smelters has led to imitations, but the most valuable improvements are secured by patents, which cannot be infringed without liability. Rankin, Brayton & Co., of the Pacific Iron Works of San Francisco, who are making a specialty of furnace work, are the manufacturers.

LOCKE'S IMPROVED LEAD-SMELTING FURNACE.

[From the San Francisco Mining and Scientific Press.]

The exhibit at the Denver Exposition of an improved lead-smelting urnace, manufactured by the Lane & Bodley Company of Cincinnati, Ohio, from designs furnished by Col. Jos. M. Locke, C. E., M. E., of Salt Lake City, Utah, attracted considerable attention, especially from those interested in the reduction of ores. In designing the furnace Colonel Locke has combined all the later improvements and been guided in the selection and arrangement of the same by the advice of the principal smelters in the West. The main features of this smelter can be briefly stated as follows: The crucible binders are made of ribbed wrought iron in lieu of cast, thus securing lightness without sacrifice of strength, and at the same time greatly reducing the liability to breakage. This substitution of wrought for cast iron extends throughout the whole structure. The furnace being of the rectangular pattern, the ground plan of the base is that of a rectangle 9 by 7½ feet, with the corners cut off, thus allowing the uprights which support the deck plate to have foundations outside of the crucible binders. These uprights are rolled I beams, the grooves in their sides forming excellent racks for tools. The deck plate is also made of rolled beams placed some distance apart, the space between them being utilized as a conduit for any vapors escaping from the furnace. Pipes lead from the above conduits to the top of the building. The water jacket, which is in sections, is made of steel, in the following manner: The sheet forming the fire side of the jacket is shaped into a box over six inches deep without cutting the corners, so as not to have any riveted or welded joint exposed to the fire. The back plate is formed into a shallow box fitting into the other, the concave sides of both boxes facing outward, the outer edges of the two parts being flush, and in which position they are riveted and calked, thus leaving the joint entirely on the outside. Attached to the outside of the jackets are hoppers open at the top, and through which the cold water is supplied to keep the jackets cool, and from which there is an overflow for the hot water. This form, known as the open-topped jacket, claims advantages over the old method of closed jackets with an inlet and outlet pipe, in which case, if the openings of the inlet pipes are neglected or either pipe becomes obstructed, the results are serious, as steam would in such a case accumulate in the jackets to force out the water, and thus expose the jacket to being burnt.

In the present form such neglect or accidents become known at once to the furnace man, and in case of obstruction to the supply pipes the open-topped hopper affords an opportunity to furnish the jacket with water during the repair of piping. The end jackets do not come down to the crucible by about seven inches. The space so left is filled up with a small closed top jacket, which can be readily removed. This construction does away with the old-fashioned brick breast, and in case of necessity enables the furnace man to rapidly open and close up the furnace at any time it becomes desirable so to do. All the piping for air, supply, and discharge of water, and the valves to the same, are so arranged as to admit of any jacket being removed without disturbing the connection of the remainder, and all valves are within ready reach of the furnace man. The ultimate economy of these steel jackets has been fully demonstrated by experience at the large smelting works of the Horn Silver Mining Company, near Salt Lake, where five furnaces are in operation, each measuring 40 inches by 9 feet at the tuyeres. These five furnaces during the first six months of 1882 had an output of over $2,000,000 in value.

The shape of the furnace internally is as follows: From the tuyeres upwards the water jacket has a bosh on the sides, thus increasing the width to 5½ feet; the ends are perpendicular from the top of the jacket; the sides are perpendicular to the feed door, making the shaft 5 by 5½ feet. The height should be adapted to the character of the ore to be worked. The Lane & Bodley Company have a western office at Salt Lake City, Utah, of which Colonel Locke is manager.

[From the New York Engineering and Mining Journal.]

HIGH PERCENTAGE OF LIME IN LEAD SHAFT-FURNACE SLAGS.

By Albert F. Schneider, E. M., C. E., *Germania Works, Utah.*

The peculiar conditions under which lead and silver ores are now smelted in Salt Lake Valley, Utah, render it advantageous to make slags that are siliceous and carry a high percentage of lime. The ores treated come from Utah, Idaho, Montana, and Nevada. Nine-tenths come from Utah. These ores are siliceous, and contain but little fluxing material, the iron present scarcely sufficing for the sulphur and arsenic. Formerly, ores high in iron were furnished from Cottonwood cañons; but this supply is meager. The ores from Idaho, Montana, and Nevada are high-grade galenas, more or less impure; generally requiring a large amount of iron for the sulphur, arsenic, and antimony. In the winter and spring of 1880–'81, we were treating at the Germania Works principally Bingham Cañon lead ores, and silver ores from Tintic; the former containing from 15 to 30 per cent. of silica, and only from 4 to 5 per cent. of iron (generally as iron pyrites); ranging high in lead, low in silver, and carrying more or less alumina. The lead was present chiefly as carbonate. The silver ores from Tintic contained sulphides, and ran as high as 80 per cent. in silica.

We had been running on a slag approximating 40 per cent. of protoxide of iron, 20 per cent. of lime, 10 per cent. of other bases, and 30 per cent. of silica, which had heretofore been very satisfactory; but with the class of ores then coming in, it was of the utmost advantage to use less iron and more lime; especially as the iron ore (from 50 to 55 per cent. of iron and from 5 to 7 per cent. of silica) cost four times as much as the limestone (from 50 to 55 per cent. of lime and from 3 to 5 per cent. of silica). The large amount of alumina in the slags influenced them for the worse; the addition of lime to the charge helped them; and after many experiments regarding the proportion of protoxide of iron, lime, and silica, a slag approximating 35 per cent. of protoxide of iron, 25 per cent. of lime, 5 per cent. of other bases, and 35 per cent. of silica seemed to answer our purpose. The percentage of alumina had a marked effect upon the silica in the slag.

Being called East about this time, my assistant, Mr. T. S. Austin, pursued the matter further, and while cleaning up some scrap iron that had accumulated at the works, made a slag of the following composition: 27 per cent. of protoxide of iron, 28 per cent. of lime, 8 per cent. of alumina, and 34 per cent. of silica; but concluded that it was slightly too acid and limy, thinking that 30 per cent. of protoxide of iron, 28 per cent. of lime, and 33 per cent. of silica would work better; this was made the basis for further trials when I returned from the East. The furnaces were then run on slags ranging in composition from 24 per cent. to 28 per cent. of lime, from 30 to 32 per cent. of protoxide of iron, from 32 to 35 per cent. of silica, and from 5 to 10 per cent. of alumina. But for some ores the proportion of lime seemed still too small, and the slags not acid enough. So, starting with 30 per cent. of lime, 30 per cent. of protoxide of iron, and 35 per cent. of silica, changing to 28 per cent. of protoxide of iron, 30 per cent. of lime, and 36 per cent. of silica, we settled at last on the proportion of 3 protoxide of iron, 3 of lime, 4 of silica; but with slags ranging from 7 to 12 per cent. of alumina and from 2 to 4 per cent. of other bases (besides protoxide of iron and lime), the slags were a little too acid for the amount of protoxide of iron present, so that the formula had to be continually modified accordingly. As a general rule, the increase in alumina called for an increase in the proportion of lime; hence a slag with 24 per cent. of protoxide of iron, 30 per cent. of lime, 34 per cent. of silica, and 10 per cent. of alumina, ran very well.

A trial was made of carrying twice as much lime as protoxide of iron in a slag made from ores containing considerable alumina. The trial was too short to give any definite results; and when the slag was analyzed, it only showed 35 per cent. of lime and 21 per cent. of protoxide of iron. The furnace remained open and hot during the experiment.

Many details have been omitted in this sketch as well as fractions of percentages, as they would not alter the principle. Although the slags varied greatly in the percentages of lime, protoxide of iron, alumina, and silica, yet the ratio between these was quite fixed, and approximated certain types. When normal, the slags approximating the proportion of 7 protoxide of iron, 7 silica, 5 lime, 1 to 1.5 alumina, and those of 4 silica, 3 protoxide of iron, 3 lime, and 1 alumina, are clean as regards silver and lead, and keep the furnace open and hot; the former driving a little faster, and both using but little more fuel than those high in iron. These slags have a smooth, oily flow, and, even when considerable matte is present, make but little splutter as they run into the slag-pots. They have a distinct crystallization—the first mentioned, short rhombic prisms; the latter, rhombohedrons. The crystals are black, with a greenish tinge, glassy, well defined, apparently built up, a depression being frequently seen on the plane faces. Any excess or lack in the principal constituents of the slag changes the crystallization in a marked degree, ranging from what might be called pectolitic and stringy to fine granular, non-crystalline, with many gradations between. The presence of alumina has a marked tendency to decrease the percentage of silica and iron, and raise that of lime, so that latterly the slags have approximated from 35 to 36 per cent. of silica, from 25 to 27 per cent. of protoxide of iron, from 26 to 28 per cent. of lime, and 10 per cent. of alumina. (With only from 2 to 3 per cent. of alumina, the slags have run up to 39 per cent. of silica.)

The slags are as good metallurgically as they are commercially for Utah. As stated, they contain little or no lead and silver when normal; in practice, about 0.3 per cent. lead and 0.25 of an ounce of silver per ton when making 100-ounce bullion. The furnaces run well, keep hot and open; the matte and speiss separate completely. Though using a little more fuel than the more fusible slags containing more iron, the advantage of carrying more ore and a less costly flux in the charge makes them more economical. I have been informed that Mr. August Rath, the efficient superintendent of the Horn-Silver Smelting Works, has been and is running his furnace very successfully on siliceous slags very high in lime; the ores treated being siliceous, containing much sulphate of lead, free sulphur, and antimony.

There is one peculiarity about the matte made with these slags; it averages as low in lead, or even lower, but higher in silver, than that made with slag containing more iron and less lime. The amount of matte made with these slags is less than that made with slags high in iron. Taking this latter fact into account, with the fact that these slags, as a general thing, come down practically short in lime, notwithstanding the most careful analyses of ores and fluxes, the almost inevitable conclusion is, that sulphide of calcium is formed, and goes into the slag. The slags, when analyzed, show an excess of lime, though practically the lime is needed; this excess is seemingly due to the sulphide of calcium. The speiss made with these slags seems normal. All kinds of ores are now treated with these slags, from impure sulphides to pure carbonates.

It might be well to call attention again to the important part played by alumina. In an abnormal slag made some years ago, the silica was only 20 per cent.; alumina, 15 per cent.; lime, 25 per cent.; protoxide of iron, 36 per cent.; and yet the slag ran well and was apparently acid to the eye. Similar shortages in silica were noted in presence of much alumina, but not to so great an extent. The furnace remained hot and open. The almost invariable shortage in silica in presence of large amounts of alumina, and the needed addition of lime, seem to point, perhaps feebly, to the conclusion that alumina, under certain conditions, acts as an acid in slags.

The furnaces were generally run on coke and charcoal, sometimes on coke alone. They are too low for the best working of these slags, being only 11½ feet from the tuyeres to the charging-doors. The furnaces of small cross-section in the crucible worked poorly. In a furnace of large section, lately built, these slags worked best; and should the furnaces be made considerably higher (or by using hot blast), there seems to be no reason why even a higher percentage of silica and lime should not be used in lead shaft furnaces.

Since the above was written, slags running over 40 per cent. silica, with considerably less protoxide of iron than any of the slags mentioned, have been made to work successfully.

PLACER GOLD.

The following interesting paper was read at a meeting of the San Francisco Microscopical Society, by Henry G. Hanks, State mineralogist:

Some years ago I read a paper before this society on "Rusty Gold," giving the result of my experiments and observations up to that time. I have since continued the study of placer gold in this abnormal condition, which has led to the discovery of important facts, bearing on the production of gold in California, and, as these discoveries must, to a great extent, have remained unknown were it not for the microscope, I consider this society the proper medium through which to make them public.

For many months I have conducted a series of experiments in my private laboratory on placer gold from numerous localities in the State. I have also studied the behavior of gold in the presence of mercury under all conditions I could think of, the results of which have been carefully recorded and preserved for publication, the most important of which may be summed up as follows:

When perfectly clean gold is exposed to the action of pure quicksilver it is instantly seized by the latter and coated with amalgam. The accident of gold being alloyed with other metals in nature does not impair its affinity for mercury, if the surface is made bright mechanically by filing or scraping. Much of the native gold found in placer mines, apparently clean, is slightly tarnished by the oxidizing or mineralizing of its alloy, in which case it amalgamates with difficulty. I have failed in every instance to find gold in quartz in this condition, although intelligent miners have informed me that they have sometimes observed it in their experience. A large proportion of the placer gold found in California is wholly or partly coated with silica, cemented by sesquioxide of iron, as stated in my former paper. When wholly coated it is perfectly inert to the action of mercury (one might as well put gold in a glass bottle and attempt to amalgamate it from the outside). When partly coated, the exposed parts become amalgamated, and to that extent only is the gold held by the mercury. If rusty gold is digested in hydrochloric acid the iron is dissolved, and a slight mechanical force then serves to detach the silica, when amalgamation takes place without difficulty. There is no hope of being able to free the gold from this coating during the few hours it is exposed to the forces employed in the well-known hydraulic process. When clean gold amalgamates it does not become homogeneous, but the amalgam forms only on the surface. I have had a piece of placer gold in mercury, standing in my laboratory, for several months, during which time I have frequently triturated it—sometimes several times a day—and it is not yet dissolved; still, in pouring from one vessel to another, the mercury flows freely without showing the gold, but I can at any time fish it up with my finger. Gold, so amalgamated, could not, in the process of placer washing, escape from the mercury, but coated gold, under the same circumstances, will float on the surface of the quicksilver, and any slight force sufficient to overcome its specific gravity will detach it.

The coating of gold may be imitated, as found by experiment. A piece of pure gold, after annealing, was placed in pure mercury, and it instantly became amalgamated. Another portion, exactly similar, was hammered on a perfectly clean and polished anvil, with a polished hammer, and placed in mercury like the first. It became as quickly amalgamated. Pure quartz was then ground to a powder and sifted on the anvil in a thin stratum. A third piece of the same gold was then laid on the powdered quartz, struck several times with the hammer, turned over, placed on a different spot, and again hammered. The gold was then examined under the microscope, and seen to resemble the coated gold found in the placers, the quartz particles being embedded in its surface. When placed in mercury, and allowed to remain for some time with frequent agitation, it floated on the surface, and seemed to be wholly unacted upon, but when placed under the microscope it was found that the mercury had attacked the gold through the small interstices, but only to a very limited extent. The gold was then placed on an iron slab, and gently rubbed with an iron muller, by which treatment it became more perfectly coated, and was now an exact imitation of the natural coated gold, minus the iron cement. In the natural coating of placer gold I consider the cementing to be a secondary process, and the sesquioxide of iron to result from the decomposing pyrite, which was abundant in the quartz veins that yielded the gold.

I have reason to believe that we have been generally mistaken as to the genesis of the auriferous gravels in the beds of the ancient rivers; for river beds they are, without a reasonable doubt. But the theory that these immense bodies of gravel were deposited by a great flood, by a series of floods, or by long deposition by the rivers themselves, does not account for the gold in them. The microscope seems to show that they are not river sand at all, and have never been far removed from the place that gave them birth. I have examined samples from many localities, including some of the most noted hydraulic mines in the State, and the result is invariably the same. The sand grains are all sharp and angular and not at all worn, as are those from the seashore, the great Colorado desert, the agricultural soils, and the beds of the present rivers. To verify these results, I pulverized quartz on an iron slab to different degrees of fineness, and examined it under the microscope, finding it identical with the sands from the gravels of the gold placers.

That the beds of the auriferous gravels are channels of ancient rivers seems to be proved by an examination of the surfaces exposed in the hydraulic mines, in which may be seen deep pot-holes worn by bowlders kept in violent and long-continued motion, the little deposits of magnetic sands under the lee of protecting bowlders, marks of eddies, and by the fact that all flat bowlders on the bottom overlap like shingles on a house top, the small ends being invariably down stream. That the channels were filled by the rivers themselves seems to be as clearly disproved by the fact that gold is distributed throughout the whole mass, from bed-rock to surface, by the sharp angular sands, and by the coated gold. Water must have flowed in the ancient rivers comparatively free from obstruction for a long period before the deposition of the gravels to admit of the deep pot-holes being worn in the hard rocks. From the examination of the hydraulic sands it is fair to infer that the same force that crushed the rocks set the gold free, flattened the grains, and coated those which passed between the rocks and the grinding force, in a manner similar to that pursued in my experiment mentioned before.

To convey an idea of the enormous quantity of matter moved in hydraulic mining, calculations have been made from published data, in which the gravel moved is compared with the gold produced. At the Sailors' Union mine, Iowa Hill ridge, 1.615577 parts, by weight, were washed away to obtain one part of gold. At the North Bloomfield, in Nevada County, the removal of 12.107116 parts of gravel was required to yield one part of gold. A mechanical analysis of hydraulic gravels was made from the well-known hydraulic mines, from which it would appear that a large portion of troublesome mining *débris* might be diverted from the river beds, where the contour of the country will admit, and spread harmlessly on some hillside, or deposited in a cañon, where it could do no damage. A sample from a pillar in the Nevada mine chalk bluffs, Nevada County, contains:

	Per cent.
Large pebbles	39.80
Smaller	29.80
Total	69.60

The remaining 30.40 per cent. would all pass through a grizzly, the bars of which were 1 inch apart. If the large bowlders in the mine could be calculated it would greatly increase the percentage of coarse material. A sample of gravel from the Polar Star mine at Dutch Flat, Placer County, gave 40 per cent. of coarse matter, but as it is well known that the majority of the filling in the channel at this mine is large bowlders, this analysis is only interesting as showing that 40 per cent. of the comparatively fine gravel is coarse enough to be separated by properly-constructed gratings.

To show the relation between hydraulic mining and pan washing I submit an analysis of the latter, which is perfection itself for saving gold, although hydraulic mining claims to be the same on a gigantic scale. The skillful miner, in washing a panful of dirt, unconsciously divides the operation into five stages: First, he allows a certain quantity of water to flow over the rim of the pan as he holds it in a convenient stream or prospecting trough. He breaks the lumps with his fingers and stirs the contents of the pan until a soft mud is formed. Sinking, now, the pan beneath the water, the second stage commences. This is to so agitate the muddy prospect that gold, gravel, and coarse sand sink to the bottom, while the finer and lighter particles flow over the rim and escape. This being for a time continued the remaining contents of the pan become clean and the water is no longer loaded with slickens. The third operation is to pick out carefully all the large pebbles and gravel, which are examined, and if found worthless, are thrown aside. The agitation is continued with but little water in the pan, and by a motion of the ball of the thumb, difficult to describe, the coarse particles are raked out and rejected. At this stage a very large proportion of the original prospect has been removed, but every grain of gold lies at the bottom, although still invisible. The fourth operation is to so agitate the remaining contents of the pan (now inclined and only partly under the water) that the coarse sand flows over the edge in a thin stream, every particle passing under the eye of the operator, who may be certain that no gold escapes. This is continued until but a small quantity remains in the pan, when, lifting it from the water, the last operation begins, which is the concentration and perfect separation of the gold. This is effected by an undulatory motion, causing the sand to flow with the water across the bottom of the pan, revealing a cluster of gold particles, if the dirt is rich, and wholly isolated. The pan is then inclined toward the sand, leaving the gold stranded in one portion, and the sand and water lying in another. The edge containing the sand is then held over and very near the water, of which the miner lifts a small quantity in the hollow of his hand, and, pouring it behind the sand, washes it away, leaving the gold only in the pan. There being no quicksilver used, the gold is collected wholly by its specific gravity, and rusty or coated gold particles would be found with the other gold, although it might be mistaken for something else and thrown out as worthless by an inexperienced prospector.

After a careful study of this most interesting and important subject, I cannot evade the conclusion that hydraulic mining, notwithstanding its wonderful advancement, is still in an imperfect state. I am convinced that more gold is lost than is generally known or miners are willing to admit. This being granted, a remedy should be sought, and, as theory is not always confirmed by practice, experiments on a moderate scale should be made, based on the experience of miners, who are aware of the loss, but helpless to prevent it.

It is my opinion that the methods now employed in hydraulic mining should be materially modified. As far as the disintegration of the gravels is concerned, nothing could be better, but the very force used in this operation defeats the object if carried too far. I consider it a foregone conclusion that coated gold cannot be saved by the use of quicksilver alone, and that it, with much of the fine gold, is carried forward by the great force of the water in the sluices and lost in the dump. This force, necessary to wash down the gravel banks, is not desirable in the sluices; on the contrary, it is highly detrimental if the great mass of the worthless material can be got rid of at an early stage of the operation, as practiced on a small scale in pan washing. It is only to carry this *débris* through the sluices that this powerful current of water is required.

It is easy to find fault with the working of any process in use, but not so easy to propose a remedy. What I am about to suggest is purely theoretical, and may not work in practice, but it is worthy of the consideration of miners. The "grizzly" is a grating of iron bars now used in nearly all hydraulic mines of the State to sift out, on a large scale, the bowlders present in the flowing *débris*, and it is a recognized principle to do this as early as possible. The *débris*, freed from the larger bowlders, passes through the sluices more freely, after which it is caused to flow over the pavements and dropped on the bed-rock. But there is a point beyond which this treatment should cease. The proper point being decided upon, a set of grizzlies should be introduced, diminishing in fineness until the last one is no wider between the bars than twice or thrice the width of the largest particles of gold found in the mine as learned by experience. What remains on the grizzlies should be conveyed to the dump by a special channel, using a large portion of the available water for that purpose, or, when possible, shot off into some lateral cañon or depression. To divide the water, and at the same time to allow a portion to pass through with the fine gravel and sands, the bars of the last grizzly should be laid at right angles with the current and given the proper grade, which can only be learned by experience. What passes the last grizzly should be conveyed—using the remainder of the water—through sluices, as at present, but with less grade, and so constructed that a considerable portion of the heavier matters should remain in them, including the gold, arrested by properly constructed riffles. From this point it might be necessary to have double sluices, one to be used while the other is being cleaned up.

At proper periods, as determined by experience, the accumulations should be removed and concentrated, using either of the well-known concentrators for that purpose. Rusty gold would thus be saved by its specific gravity, which is known to escape the quicksilver, while fine gold, moving more slowly in the less inclined sluice beds, would find its way to the bottom and be saved. This is attempted now, in the undercurrents, but the fault with them is that there is too little space provided for the accumulation of the heavier parts of the material washed, and the absence of the secondary concentration.

Small bowlders are now rushed through the whole length of the sluices and dumped into the rivers miles away. It is absurd to suppose that gold should not be carried forward with this rush of water, and specially so after the interstices between the pavement blocks are filled.

At the American mine, Nevada County, there are twenty undercurrents, and gold is saved on the last one. Is it supposable that another would not also save a portion of the precious metal? It is a well-known fact that diamonds exist in the gravels of some of the deep placers, and it may be assumed that they are also in others, not now known. Yet it seldom occurs that one is found, which I consider another proof that too great a force of water is employed in the sluices below the bed-rock tunnels.

This proposed improvement is clearly based on the results of my experiments, and it seems to be theoretically correct, but how it will meet the views of experienced miners, or how it will work in practice, remains to be proved.

AIR IN MINES.

[From the San Francisco Mining and Scientific Press.]

There are two principles which are relied upon to ventilate a mine: that of heat expanding the air and the abhorrence of a vacuum by nature. Add to these a system of pumping or forcing air into a place, and we have the three ideas upon the expansion of which into practical methods all ventilation of mining properties depends. There are various causes which develop heat in mines; the lamps or candles by the light of which the miner works, the heat given out by the bodies of the men as the result of that work, the oxidation of sulphur, if any be present in the mineral or in the walls, being among them. There may be, too, the heat of thermal springs, or, if the mine be deep enough, that which is found in the rock. If we suppose a shaft to be sunk, say 2,000 feet, and if in the center of that shaft we placed a tube, or box, or any substance—wood, for example—which runs from the surface of the ground to the bottom of the shaft, there would be at once created a circulation of air. The air around the sides of the shaft being heated by the walls would rise, and the vacuum so created would draw the cold air down through the box. But if we kindled a fire below the box, the current of air would be down the shaft and up the box.

The system of ventilating a mine by heat is simply the one which we have imagined expanded to the extent necessary to ventilate the whole mine. If we run off at one side from the bottom of our shaft a level of 500 feet in length, and carried the box into the face of it, we would have precisely the same thing taking place as before. The air, as heated by the walls, would travel along the level and ascend the shaft, while the cold air would come through the box. If instead of constructing a box we placed a division in the shaft, cutting it into two equal parts, as we do so often in this country, the cold air would descend on one side and the warm air would ascend on the other. Suppose, however, that we had two shafts, one at each end of the level; then the air would come down one, traverse the level, and go up the other. The direction in which it would travel would depend altogether upon the size of the shafts or the amount of heat generated. If the shafts were of unequal size the air would come down the smaller and go up the larger. If it is the same the air would move in the direction of that shaft the center or the equilibrium of heat was nearest to. If the center or equilibrium of heat was exactly in the center of the level, and if the friction on the air was exactly equal in each shaft, then we could cause the air to move whichever way we pleased by building a fire at the foot of the shaft we wished it to ascend. Keeping that fire burning for a day would be sufficient to cause the air to ascend that shaft in preference to the other for all time, because the cold air constantly descending through one shaft would cool that shaft off and so move the point of equilibrium of heat nearer to the other.

The ventilation of a mine where pumping is not necessary is merely an expansion of the system which has just been outlined. But there are two most important variations possible in the application of this system. We may either take the fresh air in through a box to the workings or we may take the foul air out. Each has its advantages. In the first we find the introduction of the fresh air and the removal of the foul easier than in the second. In the second the foul air and gases generated by blasts are carried off at once and are not forced to travel through the level to the shaft.

FANS FOR MINE VENTILATION.

[From the San Francisco Mining and Scientific Press.]

Nasmyth's fan did not make for its author a name equal to that earned by his great work in connection with the steam-hammer, but is remarkable in being the first attempt on a large scale to apply the principle to mine ventilation. The fan was 13½ feet diameter, with eight vanes, each 3 feet 6 inches wide and 3 feet long. The fan worked within a casing, consisting of two fixed sides of thin wrought plate, entirely open round the circumference, the sides being 3 inches clear from the edges of the vanes, and having a circular opening of 6 feet diameter in the center of each, from which rectangular wrought-iron trunks were carried down for the entrance of air. The two air trunks joined below the fan, and communicated with the pit by means of a horizontal tunnel, which entered the pit 7 yards below the surface. This fan was worked at 60 revolutions per minute, giving a velocity at the circumference of the fan of 2,545 feet per minute. The results from this fan were considered so satisfactory that it was proposed shortly afterwards to construct one 21 feet in diameter. It gives one an idea how people were seeing that large fans were becoming necessary, that whereas Mr. Nasmyth, before the British Association some few years previously, recommended fans 4 feet 6 inches in diameter, he actually fixed one 13 feet 6 inches, and afterwards proposed 21 feet.

Brunton's fan preceded Nasmyth's, but was on a much less scale, and did not attain the same amount of success. It consisted of a horizontal wheel 9 feet in diameter, covering the top of the air shaft, with a large number of vanes, inclined like the vanes of a windmill or the blades of a screw. The air had access to the vanes on the under side, and was expelled from the upper side of the fan. The plan was found to be unsatisfactory as a means of ventilation, and was entirely abandoned. In 1855 another fan of Brunton's was tried, and this time it was 20 feet in diameter, with blades radial and vertical. The construction was still that of a horizontal wheel placed over the pit. The air entered at the center of the lower side and was expelled at the circumference.

Biram's fan was the first attempt to form the blades upon correct principles. Instead of following in the lines of Nasmyth and Brunton, and having radial blades, they were inclined backwards. One of these fan's, about 24 feet diameter, was erected in Durham, and some experiments were given, as showing so low a useful effect as 12½ per cent.; but the author of the experiment rather overdoes it by saying that, from experience with other open running fans, he considers this percentage cannot be materially exceeded by any similar form of open fan without a casing. This means that Biram's was the best of the open running fans; but the same writer admits further on that Waddle, with his open running fan, obtained 39 per cent., and the North of England committee has (December, 1881) reported experiments upon a Waddle fan showing nearly 53 per cent. useful effect. It was not a fan likely to obtain a very high useful effect, as compared with others since introduced, but it was certainly equal to more than 12½ per cent., and its inventor deserves credit for having introduced into mechanical ventilators inclined blades.

Biram, in his specification, dated 4th June, 1853, argues that as the efficacy of a fan must be mainly produced by the outer end of the vanes, it was desirable to have their depth, not as with Nasmyth's, one-half the radius, but only one-tenth, and increase their number to so many that a tangent from the root of one blade would just clear the top of the next. The idea being that each blade would exactly sweep out all the air between the two blades, whilst that portion of a revolution was made equal to the distance from one blade to the next. So that for every complete revolution each blade would sweep out a quantity of air equal to the capacity between all the blades. In this same specification there are illustrations and descriptions of improvements in winding. It was proposed to fix the drums upon which flat ropes are wound over the pit for drawing up coals, and applying the power of two engines to cranks fixed at right angles to each other, upon the shaft of one of them, the other having also cranks at the end of the shaft similarly fixed, and the two being connected by coupling-bars exactly in the way four driving-wheels are connected in a locomotive engine. The advantage of this arrangement is, besides dispensing with a fly-wheel and extra pulleys over the pit top, the facility which it gives of inclosing the whole of the machinery within a moderate-sized building, and giving the engine-man better sight, therefore better control of his engines. Biram appears to have been indefatigable in his endeavors to effect improvements in the working and winding of coals, and will always be remembered in connection with the anemometer and ventilating-fan which bear his name. The fans that have come into most general use, and deservedly so, are the Waddle, Schiele, and Guibal.

Waddle's fan receives its air on one side only at the center, and is what is called open-running; that is, it delivers the air all around the circumference. The passages for air from the center to the circumference are nicely curved, so as to make the passage of air as easy as possible. The Waddle ventilator has its air-passages through the fan with a gradually decreasing section from the center to the circumference, so that the velocity of rotation at any distance from the center, multiplied by the sectional area of passage at that distance, should be constant, with the view of keeping the fan filled up to its circumference with issuing air, and preventing the possibility of re-entries of air from the external atmosphere. Some bell-mouthing is provided at the circumference to ease the delivery. The blades are inclined backwards, and the whole structure revolves; that is, the blades and casing are all in one revolving piece. This fan is made large, and makes a moderate number of revolutions per minute.

Schiele's fan is made small in diameter and runs very quickly. The blades are inclined backwards for some part of their length, and at their tips are curved backwards. The casing is not attached to the revolving portion, and forms a spiral leading into an expanding chimney. Air is received on both sides. The blades are so constructed that the area for passages of air is uniform through the fan. The spiral casing gives a uniformly increasing space beyond the tips of the fan-blades, from nothing up to the full area of the discharge aperture, and in this way provides for the continual swelling of the volume of air in the casing, occasioned by the discharge of successive infinitesimal laminæ of air around the whole circumference of the fan. Mr. C. M. Percy, M. E., having some years ago to erect a Schiele fan at one colliery that had not been equal to the requirements of another colliery, was forced to take considerable interest in it. No other fan could well have been erected. There was not space and the foundation was too treacherous for a heavy structure.

The fan was 14 feet in diameter, and running at 100 revolutions per minute, produced about 1,000 cubic feet of air for each revolution, with 1.2 water gauge. It proved quite equal to the wants of its new habitation, and gave no trouble. The special circumstances and the fair results obtained perhaps sufficiently explain a slight leaning towards this ventilator. Of three other Schiele fans which have come under notice, and all of which have been in constant work for several years, the following are the results: Diameter, 12 feet; revolutions, 160 per minute; water gauge, 1.5 inches; quantity of air, 160,000 cubic feet per minute. Diameter, 9½ feet; revolutions, 200 per minute; water gauge, 1.2 inches; quantity of air, 100,000 cubic feet per minute, being 500 cubic feet for each revolution. Diameter, 7 feet; revolutions, 275 per minute; water gauge, 1.5 inches; quantity of air, 60,000 feet per minute, being about 220 cubic feet per revolution.

The Guibal fan we are familiar with on this coast, it being more especially in use on the Comstock. Probably there are as many fans of this kind at work in England and on the continent as all other forms of ventilators combined, and certainly the balance of professional and practical opinion is in its favor. It is made large and works at a moderate speed. The casing is not attached to the fan, and the air is not discharged into a spiral, but leaves the fan at one particular place through an adjustable shutter, which can regulate the extent of opening. The air passes into an expanding chimney. The blades of this fan are inclined backwards, and at the tips are curved so as to be radial with the circumference, having practically radial blades. In width the blades are parallel, and the air can be received either at one side or both. The Guibal fan has been unfortunate in several cases in the shaft breaking. At one colliery in Yorkshire two steel shafts broke in two years. It does not appear that the shaft was, either in material or in size, insufficient for its work, because for a fan 46 feet in diameter and 15 feet wide, the material was steel and the diameter 21 inches, which would give an enormous transverse and torsional strength. But it did appear that the construction was bad, because a third shaft of wrought iron has already worked longer than its two predecessors. The difficulty seems to be the making so large a shaft sound, and a good plan for such large masses would be to have them hollow and manufactured from Whitworth compressed steel. Some ten years ago a screw-propeller shaft for engines, indicating upwards of 5,000 horse-power, was made hollow of compressed steel, and has given good results. Another difficulty very common with such large fans as 46 and 50 feet diameter is the heating of the bearings, which is not occasioned so much by the mere dead weight as by the weight causing deflection of the shaft, and so preventing it lying level upon the bearings.

MINERS' NEW SAFETY LAMP.

[From the San Francisco Mining and Scientific Press.]

There are generally two kinds of safety lamps used in fiery mines. One, like the primitive Davy lamp, is surrounded from top to bottom with a metallic gauze of a greater or less degree of fineness; the other, in order to furnish a better light, is supplied at the base in front of the burner with a short crystal cylinder, suitably protected by thick iron wire, and firmly fastened to the metallic gauze placed above. These two kinds of lamps render undoubted services, but cannot, however, provide complete immunity from accidents. They show the presence of gas but do not prevent explosions. The new Birckel lamp guards against the difficulties. It is so arranged as to not only indicate the presence of gas, but to go out automatically if there is much of it. The Birckel lamp belongs to the species of lamp with a crystal cylinder. It differs from the old lamps by a double case made of tin, which completely covers the metallic gauze. The interior case is fixed to the gauze itself; the exterior case can slide round the interior with a gentle friction. For the admission of air and the emission of the products of combustion of the oil, the two cases are pierced with a certain number of vertical openings made in the tin, parallel to the lines of the cylinder. For the lamp to work, it is evident that the openings of the movable outer case shall correspond to those of the fixed case. This is the ordinary state of things. In this state the lamp burns easily, and gives a good light through the crystal cylinder. The attentive miner recognizes the presence of gas, by signs which are well known to all—the blue halo round the white flame. To avoid all danger, it is sufficient for him then rapidly to turn the movable case. The openings are then closed and the lamp is extinguished. But here again this presupposes that the miner watches the lamp and not his work. The danger of explosion is not therefore overcome. But here is the expedient to which M. Birckel has recourse. He has observed that in reducing the width of the apertures, by the partial rotation of the gas, to six or seven millimeters, the pure air no longer was furnished in sufficient proportion to maintain the combustion of the burner as soon as the atmosphere became explosive. Under these conditions, therefore, the lamp is spontaneously extinguished. The danger of explosion is thus seen to be avoided automatically by the lamp itself. At Pechelbronn, France, all the miners have been using this lamp two years, without there having been any accident.

WATER USED IN QUARTZ MILLS.

[From the San Francisco Mining and Scientific Press.]

The quantity of water consumed in the batteries varies with the character of the ore and the degree of fineness to which it is crushed. Usually in the mills of Washoe the consumption is between 250 and 300 cubic feet per ton of rock treated, or from one-third to one-half of a cubic foot of water per stamp per minute; but this includes the water used in the pans which does not pass through the batteries.

At one mill on the Comstock cited by Mr. Hague the supply tank contains 4.400 cubic feet of water, which, is sufficient for eight hours' work of full duty. The mill has 24 stamps, which crush 55 tons of rock per day, discharging at only one side of the mortar, through a No. 6 punched screen. The consumption in this instance is equal to 240 cubic feet of water per ton of rock, or .38 of a cubic foot of water per stamp per minute. Making a due allowance for a portion of the water used in amalgamation, without having passed through the batteries, the quantity actually used in crushing in this mill does not exceed one fourth, or possibly three-tenths, of 1 cubic foot per stamp per minute.

The method of measurement in the delivery of water is by "miners' inches." A "miner's inch" is the quantity of water that will pass through an orifice 1 inch square in the side of the measuring box under a head, usually, of 6 inches. The measurement is not uniform throughout the country, as different heads are used in different places. Generally, however, in California, the aperture is made 2 inches deep and as long as need be, in order to furnish the requisite number of inches, and the water in the measuring box, which is at one side of the supplying flume, is allowed to attain a height of 6 inches above the center of the orifice.

The quantity of water that will pass through an orifice of 1 inch square in the side of the box, under a head of 6 inches, determined by multiplying the area of the orifice by the theoretical velocity $\sqrt{2gh}$, and taking two-thirds of the product as effective discharge, is .02633 cubic feet per hour. The mill just referred to uses five inches of water. Assuming that its measurement is uniformly in accordance with the above conditions, the amount delivered in 24 hours is 11,361 cubic feet, equal to about 206½ cubic feet per ton of rock treated. Taking the operation of the mill referred to as a criterion, 1 inch of water is a supply for five stamps, including the quantity required for amalgamation as well as for crushing.

Another calculation is that each stamp of a mill uses 10 pounds of water in a minute; each pan uses 16 pounds a minute, and each settler uses 9 pounds a minute. If water is run from a mill into settling tanks it can be saved with a loss of 20 per cent. This will make the *actual* supply of water required in pounds per minute to be as follows: For 1 stamp, 2 pounds; 1 pan, 3.2; 1 settler, 1.8.

In the circular of the Union Iron Works, of this city, are given some figures which show the water required for a 60-stamp mill. They are as follows: 225 horse-power (the total power required) will require, per minute, 169 pounds; 60 stamps will require, per minute, 600 pounds; 22 pans, 352 pounds; 11 settlers, 99 pounds; total water required, 1,220 pounds.

Of this 1,051 pounds used for pumps, pans, and settlers can be repumped to the tank at a loss of 20 per cent.; and the 169 pounds for the engine can be condensed at a loss of 50 per cent. This will leave the actual amount to be supplied as follows:

	Pounds.
20 per cent. of 1,051 pounds	210.2
50 per cent. of 169 pounds	84.5
Total water required	294.7

This calculation is based on the supposition that a 60-stamp mill requires a total of 225 horse-power, and the following table from the same source shows how this is made up:

	Horse-power.
60 stamps @ 1⅛ horse-power	67.5
22 pans @ 4 horse-power	88.0
11 settlers @ 3 horse-power	33.0
3 concentrators @ 2 horse-power	6.0
1 rock breaker @ 2 horse-power	5.5
Friction	25.0
Total power required	225.0

Of course this is intended as a calculation for a large mill, but it will be easy for any one to figure out from what we have given almost exactly what water will be required for a mill of any size.

LOSS OF QUICKSILVER IN MILLING.

[From the San Francisco Mining and Scientific Press.]

The loss of quicksilver during the operation of working ores by the Washoe process arises from two sources—one mechanical and the other chemical. The former depends largely upon the manner in which the final washing from the pulp is conducted, the separation being more or less perfect according to the skill and care with which it is executed. A considerable quantity of the metal, however, is so cut up and ground to such a fine state of division that it is impossible to save it. The chemical loss is occasioned by the formation of the chlorides of mercury, which escape with the tailings.

In the patio process the chemical loss is frequently very considerable; the amounts of common salt and magistrale employed are large, while at the same time there is no reducing agent present to act upon the calomel formed, as is the case in the pan. In the patio the loss is said to increase in proportion to the richness of the ore in the sulphurets of silver, owing to the fact that for every atom of chloride of silver reduced by the mercury, a corresponding atom of the latter metal is consumed as subchloride.

In the Washoe process the chemical loss would seem to be small in proportion to the entire consumption. This is probably due to the beneficial effects of the iron which combines with the chlorine of the calomel, setting the quicksilver free. The more the metal is ground the more it must be cut up, and the greater difficulty in recovering it. Now if the consumption of iron is assumed to measure the grinding effect exerted by the pan, the relation between the loss of the mercury and that of the iron should be in a certain degree proportional.

The following table, compiled by J. D. Hague from the results of several mills, furnishes some interesting details in regard to the loss of mercury:

Part I shows that the loss of mercury is independent of the consumption of chemical agents. Part II shows that the loss of mercury is in some measure dependent upon the consumption of the iron of the pan.

Tons of ore.	I.				II.	
	Pounds per ton of ore.				Pounds per ton of ore.	
	Salt.	Sulphate of copper.	Sulphuric acid.	Mercury.	Iron	Mercury.
5,400	......	0.33	0.18	1.54	9.42	1.54
8,605	......	1.74	0.31	1.39	9.79	1.38
4,703	0.23	1.52	......	1.34	9.39	1.38
35,000	9.00	3.00	.....	1.33	7.50	1.33
7,523	......	1.38	......	.79	7.14	1.00

The following is the result of an analysis of some artificial crystals of Washoe amalgam:

Mercury	75.04
Silver	24.18
Gold	.77

They have the composition very closely of three atoms of mercury to one of silver.

THE GRUND ORE-DRESSING WORKS.

By H. L. Bridgman, E. M., *Member of the American Institute of Mining Engineers.*

In nearly every mining camp we find ores of too low grade or containing too unfavorable constituents to admit of advantageous manipulation by the means ordinarily employed. Oftentimes the quantity of these ores greatly exceeds that of the better classes, and then the demand is heard for cheaper processes, and men invest recklessly in all sorts of new and untried apparatus and methods. Every mining man knows that it is not to possible future metallurgical revolutions, nor to new *ne plus ultra* processes, we must look for our cheapened production, but rather to improvements in the known and tried processes we already have, and to a more intelligent application of them.

Of the means offered the metallurgist for reducing the cost of treatment none have proven so cheap, so effective, and so generally applicable as the dressing or concentration of the ores which are afterwards to be smelted. Under the term "ore-dressing" we include not merely the concentration of any one mineral constituent of an ore, but also the separation of all its valuable components—galena, copper pyrites, zincblende, &c.—both from the waste rock and from each other. This process has thus far found no very extended application in this country, although it is constantly coming more and more into favor, and it is to add a little encouragement to this movement that the following description is given of one of the best and most successful of the German works.

The works in question are located in the mining village of Grund, in the Hartz Mountains, and treat the ore of the adjacent Hülfe Göttes mine. This ore consists principally of galena with a gangue of heavy spar, a difficult combination to handle and requiring most careful manipulation. The mine produces annually about 16,500 tons of ore, which passes at once into the first division of the works, situated close by the shaft, and which, for the sake of brevity, we will designate simply as the sorting house.

The sorting house is provided with one ore-crusher of the Blake pattern, two revolving sorting tables, fourteen hydraulic jigs, one double revolving buddle, and the necessary revolving screens for the proper sizing of the crushed material.

The ore as it comes from the mine is first sized by screen into *Wände* over 65^{mm} and *Grübenklein* under 65^{mm}, the former being then reduced by the ore-crusher to the size of the latter. Both classes are then still further sized by revolving screens into "sorting ore," over 32^{mm}, and "jigging ore," under 32^{mm}, the screening of the *Grübenklein* being accompanied by a thorough washing, by means of jets, to facilitate sorting. The "jigging ore," after being properly sized, is transferred to the jigs above mentioned, the wash water and pulp being treated on the revolving buddle. The "sorting ore" is sorted by hand into three classes: Pure galena, transferred at once to the smelting works; clean gangue, to be thrown on the dump; and a middle sort to be further treated. This middle sort amounts to about 7,500 tons a year and is the material that is treated in the second division of the works, the "dressing house" proper, whose capacity, however, considerably exceeds that amount. This ore is dumped from the "sorting house" down a 40-foot winze to the level of a tunnel 1,800 feet in length, through which it is transported in tram-cars to the "dressing house." The separation of the works into two distinct parts was necessary in order to secure the water that furnishes part of the power.

The "dressing house" is substantially built in three terraces, each of which is independent of the others as regards situation and power, the latter being furnished by a 30 horse-power Corliss engine and two 24-foot overshot water-wheels. In the arrangement the gravity plan has been most successfully carried out, as in only one unimportant instance, to be noticed below, is a hoisting of any part of the material necessary. The three terraces above mentioned correspond to the three sections of the works; the first, for the treatment of the coarse material; the second, for the fine material and sand; and the third, for the pulp and slimes. The ore is delivered at the top of the first section, where it passes immediately into the coarse rolls, and thence through revolving screens which separate it into four sizes, viz: below 6^{mm}, transferred to the "fine section;" 6 to 11^{mm} and 12 to 18^{mm}, treated on two double-sieve jigs immediately below the screens; and, finally, a small per cent. above 18^{mm} returned to the rolls, the instance above referred to where a hoisting of material is necessary. The jigs deliver two classes of material, "concentrates," which, like all other concentrates, go at once to the smelting works, and a "middle sort" containing unseparated gangue and galena, which passes to the "fine section." The material which reaches this section, consisting of the last-mentioned "middle sort" from the jigs and of the size below 6^{mm} from the coarse screens, is screened into two sizes, above and below 3^{mm}, that above 3^{mm} falling directly into the fine rolls and thence into a screen, by which it is separated into a 6^{mm} to 3^{mm} size and a size below 3^{mm}, which latter is united with the before-mentioned 3^{mm} size and together passes through another screen which separates from it the sand and pulp.

We have now as a result of the crushing and screening in the "fine section" three sizes of material, viz: from 6^{mm} to 3^{mm}, about 3^{mm}, and sand and pulp; the first two are worked on two double-sieve jigs, furnishing "concentrates" and "middle sort," the latter is fed by hand into two batteries of 8 stamps each. The stamp screens have a mesh of 2^{mm} for the richer ores, which are worked during the summer; a 1^{mm} screen is employed for the poorer ores.

The sand and pulp, both from the fine rolls and from the stamps, together with the abundant water which they have accumulated, are carried in sluices to a system of seven small *Spitzkästen* (pointed boxes) where the pulp with most of the water separates from the sand and passes into the third section of the works. The sand is sized by the *Spitzkästen* into four different sizes, which are treated in as many double-sieve sand jigs furnishing concentrates and middle sorts, and the latter is screened into two sizes, one from 1^{mm} to 2^{mm} and the other less than 1^{mm}. The larger size is carried out of the building by means of a screw, to be reworked if rich enough, but generally to be thrown on the dump, while the smaller size is transferred to the *Filzherd* (revolving buddle) in the third section. The *Filzherd* yields, besides waste, a mixture of waste and galena, which is worked by hand in a kind of settling box until nothing but high-grade concentrates remain.

In addition to the *Filzherd*, the third section of the works contains two systems of three large *Spitzkästen* each, which are supplied with the fluid pulp from the second section, and each of which feeds a double-revolving buddle; these latter work very close and yield only waste and a high-grade concentrate. The overflow from the large *Spitzkästen* is conducted through a series of sumps outside the building, where almost the whole of the little remaining galena, together with considerable waste, is precipitated. This material is removed by hand from time to time, and delivered to two small auxiliary works, containing together 36 stamps and 8 double-revolving buddles; from these works the tailings pass away practically worthless.

Of the apparatus employed throughout the works, a brief explanation will suffice. The course and the fine rolls are constructed exactly alike, having a diameter of 0.72 meter and a width of 0.3 meter; they are furnished with cast-steel mantels, which are first placed on the fine rolls, and when worn rough are transferred to the coarse rolls. Both sets have a velocity at the circumference of abont 0.5 meter per second; this slow speed has proven most advantageous; the motion is easy and regular, but little material has to be recrushed, and only a small portion of the galena is reduced to powder—an important point, as in this fine material the principal losses occur.

The stamps are of the regular German pattern, with square cast-steel shoes and dies, and do not revolve, which method, while it has its advantages, is hardly as good in the long run as our California one. The coarse and fine jigs are of the ordinary Hartz pattern (than which there is no better), with the exception that they are provided with a water-saving arrangement. This consists simply in compartments outside the jig proper, into which the finished material, either concentrates or middle sorts, passes through a slit, and from which it is removed by the action of an automatic rake, so that the only water leaving the jig is the little that is incidentally carried out by this latter. This device would doubtless prove of use in many of our mining camps where water is scarce but not entirely absent. The sand jigs are of the ordinary Hartz construction, the concentrates passing through the sieve bed into the lower part of the jig, from which they are removed from time to time, while the waste is carried off in the stream of water.

The *Filzherd* is simply a concave, revolving buddle, covered with blankets; the material is fed at the periphery, and passes off at the center, waste and concentrates of course falling into different boxes. When treating poor ores the *Filzherd* makes four revolutions an hour, but for richer ores it is run somewhat faster, as the material can be prudently fed more rapidly.

The double revolving buddles consist each of a concave and a convex buddle on the same shaft, the former being above and the latter below. They are 4.12 meters and 5.32 meters, respectively, in diameter, and are not provided with blankets. The concave buddle is fed as is the *Filzherd*, and concentrates the larger part of the galena, which is at once withdrawn, while the middle sort descends to the convex buddle, where it is fed at the center and passes off at the periphery. This apparatus is very cheap, both in construction and in operation (requiring from one-quarter to one-half horse-power to run it), and does its work very satisfactorily. It is worthy of more extended employment.

The Grund works are well constructed, well managed, and efficient. The working force is very small—for instance, a shift at the dressing-house consisting of three men and two boys—and the results are most excellent, the concentrates averaging from 90 to 95 per cent. of galena, while the tailings practically carry nothing.

CALIFORNIA.

By J. R. Hardenbergh.

It may fairly be said of California that she is in the transition period of her existence as a gold-producing State, because her future mining is to take on new forms and methods scarcely less stable in themselves and the results which are to follow than are her mountain chains which inclose her incalculable mineral riches. It is the transition period because the old methods of extracting the gold with which she has been so munificently endowed are rapidly becoming obsolete; because they are giving way to new modes of proceeding and new appliances as wide apart in the results which they accomplish as are those obtained by the sickle of old and the modern reaper in the wide and ever widening field of agriculture. To say that the placers are exhausted is to every intelligent mind save that of the thrifty Mongol, who is yet content to glean in this long-ago harvested field, but to utter a truism. To say that her so-called mining regions abound in exhausted surface mines, embracing practically depopulated towns, and silent mills falling into ruin, is but to repeat facts patent to all. To say that the miner of old, who once formed so conspicuous a figure in the early annals of the State no longer exists as the self-reliant, independent character of old, but is merged into the laborer for hire, is but to note another step in the change time has wrought in mining methods in this marvelous region.

In spite of these, present evidences of her decadence as a mining State, however, a careful examination of the real facts and the real progress that is being made in gold mining and gold producing within her borders and the quiet revolution which is being effected in regard to the delusion that has so long held possession of the public mind upon mining-stock gambling will convince any impartial seeker after truth that she is destined to remain through many generations yet the queen of the great group of mining States and Territories of the United States.

The annual gold product of California, it is true, has decreased from $50,000,000 to less than $20,000,000. As an apparent evidence of steady mineral exhaustion this fact in itself would seem to be conclusive, that her importance as a gold-producing State is waning. A more careful and philosophical examination of the question, however, will evidence a contrary result.

For the twelve years subsequent to the discovery of gold in California, up to and including 1861, her total gold product was in round numbers $670,000,000, an average of more than $55,000,000 per annum. Of this amount it may safely be estimated that $50,000,000 was the product of placer and river-bed mining, both of which, except as to the unknown quantity which the Chinaman represents as the scraper of the "aftermath," have ceased to form a considerable factor in the problem. Setting down, then, this $50,000,000 per annum for twelve years at $600,000,000, we are brought to the sum total of the gold product of the State from 1861 up to and inclusive of the end of the fiscal year 1882, a period of twenty-one years, which was $518,000,000, or an average of $23,500,000 per annum. Of this amount it is probably safe to say at least $20,000,000 per annum was the result of corporative or other systematic business mining method in extensive drifts, hydraulic, and quartz mining operations, which were in the mere experimental stage of existence prior to 1861, and while gold mining in California had hardly passed the bounds of river and placer work. We see, then, that after the exhaustion of the placer deposits, mining proper began in California, and the sources from which these enormous deposits derived their origin began to be systematically attacked, with results that have shown California to still occupy the foremost place in the gold-producing regions of the United States, and with the development of endless evidences that this is to continue to remain her relative position for many generations to come.

The solid substratum of fact, upon which the future of gold mining in California rests, is this: First. The exhausted placer deposits from which, as has been shown, some $600,000,000 have been contributed to the solid wealth of the world, were, according to the generally accepted theorisms of the age, but the accumulations from the present lodes, in which they were originally held, which accumulations were the result of ages of decomposition and dispersion throughout the gravel and alluvial formations from which they have been extracted. To say that this process of decomposition and dispersion means the natural disintegration of the mother lode from which they came would be absurd.

Mining in California, subsequent to the exhaustion of the placer deposits, has been largely and successfully carried on by lode work, or, as it is more commonly known, by quartz mining, which means attacking the veins or lodes from which the original placer deposits had their origin. This class of mining, it is quite true, has not produced the largest part of California's gold product since placer mining ceased to be remunerative, but it has produced enough and gone far enough to demonstrate that the numerous gold-bearing veins in the mining regions of the State are rich beyond computation, and only await the application of proper method or process of working to make them profitable beyond compensation.

The fact that the mountains are filled with mills and mining machinery that are largely lying in idleness and going to decay argues nothing against the intrinsic value of the lodes or veins which they were erected to develop. These latter by every assay or other test which has been made of the ores which they produce, are known to be exceedingly rich in gold and silver, but which, under the popular but misleading title of "rebellious ores," have to a large extent baffled the efforts of miners and capital combined to wring from them the wealth which they contain. Does this fact argue that the gold veins of California from which have been gathered up such an enormous amount of metallic value resultant from ages of decomposition are worthless and likely to remain in their present condition because of their so-called rebellious nature? Does it not rather argue that there has been something radically wrong in the manner in which they have heretofore been worked, and that miners and capitalists alike have misled themselves by adopting and clinging to processes wholly unadapted to the extraction of the gold contained in these so-called rebellious ores?

A cursory perusal of the mining review and mining commentaries contained in the journals of California for the past twenty years will not fail to convince any fairly clear-headed reader of this. The simple truth is that since the beginning of quartz mining in California those who have engaged in it have been misled or have misled themselves by the fallacy involved in miners' *ignis fatuus*, covered by the hackneyed experience of the milling ores. As a rule the whole of the quartz mining in California, until a very recent period, has been carried on upon the basis of the "free-milling" proposition, meaning mining, crushing, pulverizing, and extracting gold by the amalgamating process, and regardless of the fact that the percentage of gold contained in the pulp, capable of being caught and retained by the agency of quicksilver in whatever form it may have been used, has been but a fraction of the assay value of the whole mass, while larger portions have as regularly gone to waste as the water has flowed from the batteries in which the ore has been treated. The results achieved therefore from the working of these ores has been but a small part of the assay value, which has, in the main, only served as the "will o' the wisp" to lead capital and human energy to merciless wreck and ruin. In spite of all this, in spite of years of costly and destructive experience, men have persistently continued to engage in mining enterprises to be carried on in the old manner, and to result in the continued accumulation of abandoned monuments of lost capital and stranded human hopes.

The free-milling manner, while it has, despite the fallacy which it involves, helped largely to swell the yearly aggregate of California's gold product, by reason of its inadequacy and utter inefficiency has visibly retarded her mineral development, and kept her yearly gold product far, very far, below the figure that her natural resources and the natural energy her people call for. It has taken many long years and the sacrifice of many hundreds of thousands of dollars to clearly demonstrate this fallacy, but miners and mining men have pursued the phantom with the determination bordering on self-destruction rather than to abandon the free-milling madness and the solace afforded for the disasters by the rebellious ore theory. The simple truth is that the wealth, the next to inexhaustible gold wealth, of California lies in the so-called rebellious ores themselves, which are in no sense rebellious other than that the gold which they contain cannot be extracted by any known free-milling amalgamating process any more than roast beef can be converted into chicken soup or fish into flesh.

It is the miner and the capitalist who have been, and still are, in the main rebellious, who rebel against every other method than the stamp mill and amalgamation, and who will not be persuaded nor put down until energy and capital are both exhausted, and their time, labor, and years are hopelessly sacrificed. Gradually, however, these sad lessons of experience have done their work. New men and new methods are coming to the front in California, and quartz mining is assuming the character of a scientific industry, with these very rebellious ores as the foundation and promise of its future success. Men are beginning to learn that the first necessary ingredient of the hare soup is the hare itself. That the first condition involved in the successful extraction of gold from the matrix in which it is held, is to gather and save the sulphurets and other metallic combinations in which it is held, and from which amalgamating processes, in whatever form they have been applied, have thus far been powerless to extract the gold which they carry in their mysterious combinations. It is true that in this respect it is but the beginning of the early dawn of common sense in the matters of practical gold mining in California, but it is the dawn which presages the sure sunlight of future success, and the revival of gold mining proper in California upon a scale which cannot fail to eventuate in results coequal to any attained in her past history, and vastly more stable, since they mean the successful development of the actual success from which all her past mining glories have been drawn. Hence it is that California to-day is, in so far as gold mining is concerned, in a transition state; that her former methods, so far as they relate to the development of her quartz mines, are to be numbered as things of the past; that these methods, except in a few isolated instances, have had their day, and are no longer practicable or profitable, and that mining proper is now about to be inaugurated. With her vast deposits of "rebellious" ores it is hardly possible to compute what her future is to bring forth. And, knowing the extent of the field to be worked, it is not too much to say that a new era is about to dawn upon this marvelous region. For, knowing as we now do, with mathematical precision, the character and extent of the gold-bearing quartz lodes of California, as is now well known, the absolute average assay value of the gold and silver contained in these mineral lodes, it is as certain as the processions of the equinox that mining in California becomes as legitimate an industry as agriculture if the time has at last arrived when a practicable process is found to extract the gold and silver value contained in these mineral lodes.

In discussing the future of gold mining in California upon the basis of new processes and new methods, it is not necessary, nor is it advisable, to advocate one process at the expense of another, or to laud the work of one inventor who has worked in this field at the expense of another. This great question rests upon a broader foundation than this, and involves great principles which the work of no one, two, or more inventors, however skillful or ingenious, can cover.

New processes and new methods, in the sense in which we are considering them, mean an abrupt departure from the old beaten path of "free milling" and amalgamation. They mean systematic procedure by which the so-called low-grade ores of California may be cheaply and quickly transmuted into high-grade ores, and when such transmutation has been accomplished they may be ready for scientific metallurgical treatment, by which, through the aid of intelligent chemical science, they may be converted into ingots of gold and silver, and the base metals with which they are combined be at the same time brought into use and made to yield their proportion of profit to the intelligent miner. The new processes and new methods by which these important results are to be brought about mean, first, simple and cheap methods of concentration; appliances by which, when low-grade ore has been mined in the first place and brought to the surface ready for treatment, it may be quickly and cheaply denuded of the large part of its useless or waste material—its *gangue*, in scientific parlance—and so be made ready for the smelter or other operator, who from the standpoint can with unerring certainty skillfully quell all the rebellious qualities which it possesses and compel it to yield its perfect value. New processes and new methods, therefore, in the sense in which they are being here considered, mean cheap and rapid concentration and reduction of ores, as against the "free-milling" theories that have so long held suicidal sway in mining circles in this State.

Before proceeding to analyze and consider this great question of cheap concentration and reduction of ores, as the method by which California, and indeed all the mining States and Territories of the United States, is to make mining as legitimate an industry as agriculture in any of its branches, it is proper first to point out some facts showing the wasteful and ill-advised methods that have heretofore prevailed in the free-milling decades that are now happily closing.

It is not unlike political discussion to attempt to argue with the stamp-mill miner and free-milling theorist, with the view or expectation of cementing them to the theory that concentration and reduction are in any manner superior to their old and long-continued practices. Yet, it is not like political discussion when they are confronted with adamantine facts which no theories can displace, and which their own years of misdirected labor and expenditure of capital all tend to confirm. Let us consider these facts as concisely as possible. There is no mining activity proper in California that does not contain within itself the perfected and developed gold-bearing quartz vein. In every case, probably, without an exception, the development and assays obtained upon such development have always justified the expenditure of the capital that has been invested, assuming that the methods of working had been adequate to the end of profitably extracting the gold known to be in such lodes or veins. Given, then, the existence of these admittedly rich veins or lodes all over the State, but a small percentage of which have been worked at a profit, what is the cause, and what the remedy involved in the paradox? Our present consideration lies with the causes; the remedies will be considered later. It is no new theory to mineralogists that gold quartz veins above the water line in any gold-mining region are one thing, and below the water line another. It is no new theory that atmospheric and earthy chemical effects have bleached, or in some other way "freed" the gold carried in auriferous quartz veins, through long ages of cause and effect, and rendering it easy of capture by the free milling and amalgamating process; while below the water line the original formation has remained in all its puzzling, chemically alloyed combination, by which the quicksilver is as powerless an agent for the extraction of the gold held in such combination as the water itself, in which it has been submerged for countless ages. It is these "below the water line ores" that are in the main known as rebellious ores. It is these that have defied the efforts of the "free milling" maniacs, and have swallowed the capital of money-getters to a great extent. It is true in most gold-producing countries where the operations for the extraction of gold from quartz veins have been carried on, that the "brown" ores, as they are called, or the true "free-milling" ores, as they might be better designated, are generally comprised in that portion of a gold-bearing lode or vein which lies above the perpetual water line proper. They are that portion of a mineral vein from which the rebellious elements have been oxidized, bleached out, or eliminated by some other influences which have been acting through a long course of years, leaving the gold free and clean, and readily susceptible of amalgamation by and with quicksilver in any of the various methods which have been adopted for its use in this direction. Below the perpetual water line these gold-bearing veins generally assume the form of gold carried in sulphurets or other combination, to which the application of the amalgamating process has always proved unremunerative.

California is not the only gold-producing country that furnishes a practical illustration of this theory. It is true to a greater or less extent of all of them. North Carolina, which prior to the discovery of gold in California was the most important of all the gold regions in the United States, furnishes a striking example. In that State in the gold veins, which are numerous, and have been of great value, the "brown" ores constituted practically the entire sources from which the gold product was derived. When the water line was reached these "brown" ores disappeared, and sulphurets took their place, which, as in California, no amount of pounding or attrition has ever yet or ever will render available for amalgamating methods. The whole country there, in that section known as a mining region, may be said to be underlaid with sulphurets as in California, which only await a systematic and rational process of extraction to make them lastingly profitable. It is not unlikely that North Carolina will, through the new inventions of mining enterprise and efforts which are now being inaugurated there become again the scene of active and profitable mining operations, and her annual gold product once more assume an importance that will outrival all she has done in the past. The same remark will apply equally as well to all gold-producing countries, for the day of free milling is past and that of concentration and reduction by furnace, or like methods, is about to begin. It has cost millions of dollars to reach the threshold of this new era, but the new generation of mining men, and those of the old school who have at least come to their senses, have reached that threshold at last, are now about to abandon their old theories and their old methods and enter upon the new line of action. If we glance at the results of losses that have occurred in the past years by clinging to the old free milling methods, we shall see that it was time for a change. The evidences are more than numerous. They exist, not alone in the hundreds of idle mills, perishing with rust throughout the State, but in almost every quartz-mining enterprise that is being prosecuted. In the one case, that of these idle mills, absolute exhaustion of the free gold having taken place they have stopped, because there would be as much profit to be expected from milling paving stones for gold as sulphuret ores. In the other case extraordinarily rich deposits of sulphuret ores have carried with them equally large quantities of free gold, and they have therefore held out longer and with larger profits in working than the former. In both cases, however, the losses, or rather the waste in working, has been enormous, and the evidence that abounds on all sides goes to prove that in the entire scheme of quartz mining in California as long as it has been carried on, up to the present day, not more than one-half of the gold contained in the ore worked, free milling or otherwise, has been saved. The rivers, the bays, and the sea have swallowed up the rest, outside of that portion which remains in the tailings piled up here and there.

One of the oldest and best mining authorities in California (Mr. Almarin B. Paul) has said upon this subject: "As far as California is concerned, I am satisfied that not more than 40 per cent. of her gold is exhausted. The fact is, as before expressed, we are not working to save gold but to crush rock." Again he says: "Our present general system of gold mining is based upon the idea that gold is mainly coarse, while examination will show that the high percentage is in atoms finer than flour itself. In my experiments gold has been taken up so fine that in distilled water it would not precipitate in less than from five to ten minutes. Can you save gold of this kind by running water down stream? Again, can you obtain gold of this kind without minute reduction? Therein lies the secret of high assays before working, and small returns after."

Mr. Deetkin, of Grass Valley, California (Raymond's reports of 1874), in order to determine the loss of gold by mill process, tabulates a series of assays made of the tailings of ore of the best mills in the State, which shows the loss to have been 40 per cent. of the yield, of which the float loss was nearly 14 per cent.

In Australia, during eighteen months' milling of 85,251 tons, and daily assay of the tailings, the yield being only $6.52 per ton, the average loss was found to be $1.56 per ton, or 24 per cent., rated upon the amount saved. Add to this loss of float gold, carried away in the water, and the total loss would not fall short of 40 per cent.

The actual average yield of ores milled and smelted, calculated from Fossett's table of seven years' work in Colorado, showed an average value of the ore by assay to be $37.97 per ton. The average value per ton saved by milling and smelting was $14.50, showing a loss of $23.47 per ton in gold and silver, or more than 60 per cent.

In the London Quarterly Journal of Sciences, in an article on the subject, it was stated that "the gold caught on plates is under the most favorable circumstances only 40 per cent. of the assay value of the ore." The gold from the blankets and in the buddle concentrator does not amount to more than 5 per cent., so that when treating the most tractable of these sulphurets, battery-amalgamation does not secure more than 45 per cent. of the gold.

Professor Raymond has said in a former report, "It is impossible to state accurately what percentage of gold is lost in milling, as few assays are made either of the crude ore or tailings; but that a very large amount is lost cannot be doubted; and this loss probably varies from 30 to 70 per cent. according to the nature of the ore. None of the silver is saved, except a small quantity, which being obtained in the gold, merely diminishes the value of the latter metal. (Fossett's Colorado, page 292:) "It is estimated that more gold has been wasted in milling, and has been washed down the creeks and gulches, than has been saved."

Albert Reichenecker, a graduate of the German schools, an acknowledged authority in mining matters, says: "The proportion of gold saved on the plates and tables varies in a well-constructed mill between 30 and 50 per cent. of the whole amount of gold in quartz, and may average 40 per cent."

The Nevada (Cal.) Transcript some time ago remarked: "At the Merrifield mine on Deer Creek, Nevada County, a large portion of the ore is heavily impregnated with sulphurets, and notwithstanding the fact that the rock by fire assay showed its value to be hundreds of dollars per ton, yet after working the quartz by the old process and in the most approved manner, including the use of Frue's concentrator, it was found that the average pay of the ore was about $25 per ton, including sulphurets. They are now satisfied that nearly two-thirds of the gold in the rock was lost by being carried off with the sediment and water in exceedingly fine particles. No more rich sulphurets rock will be washed in the future at the above-named mine by the old method."

Professor Eggleston says: In all the methods for the extraction of the precious metals there are considerable losses. With the perfection of processes, the main object is to reduce them, or else to cheapen the labor of extracting the ores. These losses are greater than is usually supposed, because as a general rule systematic assays of the tailings are not made. Yet it is known that the tailings contain precious metals, and they are sometimes reworked with profit, especially those from the silver mines. An interesting investigation was made some years ago, the results of which are given below, showing the great loss in some of the mills:

	Yield of ore in the mill.	Remaining in tailings.		Total in tailings.
		Gold.	Silver.	
At the mill	$18 60	$10 04	$3 14	$13 18
Same tailings 350 feet from mill	18 60	5 02	3 92	8 98
Average yield of 150 tons	3 50	13 55	6 28	18 83
Average yield of 150 tons	3 50	8 79	6 28	15 07
Slime from end of sluice 310 feet long	....	56 00	33 30	89 30

It was also found that water from the mills three-fourths of a mile below them contained in suspension, as an average of twelve assays, $0.018 per gallon. There were in this locality 516,000 gallons of this water flowing away in twenty-four hours, or a loss of $339.84. It was estimated that the annual loss of two mills working 250 days in the year was $84,960. From these and similar data the conclusion is drawn that the loss is between 50 and 60 per cent. of the total yield of the ore.

It is a matter of great interest to ascertain what are the causes of the losses in order to learn how far they are capable of being remedied. The first of these is a desire to get the largest possible output from the mill. This makes the ore too coarse to have all the gold and silver amalgamate, as a portion may not be released from the gangue. It would be much better to get the output by a more careful sizing of the ore, not forcing the stamp to do the work of a Blake's crusher, and not sending to the mortars any ore fine enough to pass the screens. This is a matter of some importance, for it has been found with all kinds of stamps using screens that it takes just as long to get crushed ore which has already passed the screens out of the mortar as it does to crush and force it out. Too fine crushing is also quite as bad, for it produces "float," and is quite likely to put the precious metals in a condition in which they will not amalgamate. Supposing that the losses which result from improper working do not exist, there are a few causes of loss which do not always amount to much, but which, in the early days, were a source of considerable loss. It has been found that any holes in the castings of the stamps, pans, &c., will attract the amalgam, and that it will even be carried into holes deep in the interior of the piece. This was a source of profit in the early days to those who recovered the precious metals when the worn-out castings were melted. Another loss may be in cleaning the plates by taking off the amalgam too thoroughly. It is a well-known fact that new plates do not act as readily as old ones; the difference is so great that when the mills can afford it new plates are coated with gold or silver amalgam. Gold and silver will go much quicker to amalgam than to mercury. Too slow a current of water will keep the surface of the plates covered with a film of sand; a too rapid current will prevent the gold from being caught. If the gold is attached to a piece of the gangue rock which is relatively large, the specific gravity may be so reduced as to prevent the particles from coming in contact with the mercury. If the blankets are left too long without washing, so that the hairs become charged, the fine particles of gold are lost. If all these causes of loss are avoided there are still others; for, if the mercury is not kept clean, or made so by chemicals, the "quick," having an extremely thin film upon it, does not act upon the gold or silver. Exactly the same effect is produced, to a small extent, when the rock is soapy, as is the case with the magnesian and aluminous rocks. If there are too few amalgamating machines, if the sluices are too short, there is also a loss. A very important source of loss is the flouring of the mercury from too rapid motion, or from the too free use of chemicals. In such cases steam may be used, if it is live, fresh steam, fresh from the boiler, which prevents flouring by the expansion of the globules. If steam from the engine is used as a matter of economy, it often increases the loss, as very minute particles of grease are always carried off with it which coat the mercury.

It is not necessary to agree or disagree with these various authorities as to the causes of these losses in gold mining. Enough to say that all authorities, and they might be quoted to endless length, agree that such losses constantly occur under the system of gold mining which has heretofore prevailed; and to add as the necessary corollary that this system has been almost exclusively the stamp mill and amalgamation in one form or another, or to return to our tough matter, "free milling." Under such circumstances as these, is it too much to assert that, where such a state of facts is given, when it is conclusively demonstrated that mining in California, save the enormous gravel deposits yet to be worked by hydraulic and drift processes, which will be considered later on, is hereafter to be carried on by systematically sapping the parent sources from which have heretofore been derived her enormous placer deposits; when it is conclusively shown that these sources are no longer to be attacked by modern theories, but only upon scientific principles, which look to the absolute extraction, by profitable methods, is it too much to assert, as a logical consequence, this State is hereafter the great gold bank of issue of the world, and is, in point of inexhaustible resources in this regard, to outrival all she has been in the past?

Coming now to a consideration of the possibilities involved in quartz mining of the future in California, as compared to quartz mining of the past, it is well to consider these prominent facts:

First. There is probably hardly a quartz mill in California, whether idle or in operation, that has not been erected in the first instance upon a vein of ore which was shown by absolute exploration and assay to contain a sufficient quantity of gold to pay a handsome profit in working, provided the process of working was commensurate with the apparent profits at issue. Exceptional instances doubtless exist, but these are the exceptions and not the rule.

Second. This being the fact, if practicable methods exist, or are likely to exist, at an early day, by which these idle mills and unworked veins can be brought into action once more on scientific business principles, who is wise enough to predict the future of gold mining in California; who is unwise enough to assert that it is not destined to outrival all that has been done in the past? We come now to the subject of the true practical methods of gold mining which must prevail in the future, and which, with the evidences before us growing out of past experience on the part of all quartz mining enterprises, justify the belief that the future is destined to far out-rival the past. It will not be amiss, however, to quote one more authority upon the subject of losses in mining, and their causes, which has come to the writer's attention since all that has preceded this has been written. A late number of the Prescott (Ariz.) Miner has the following:

"As a general thing in Arizona ores found upon the surface are free milling, and so long as the ore remains such in going down upon the various mines which have been worked, good results were achieved, but so soon as water-level is struck and sulphurets appear, the ordinary machinery in use fails to save the metal and suspension of operations is necessary. In every instance, without a single exception, assays show the sulphuret ores to be the richer, hence the only thing to make mining a success in all this section is the proper machinery for the treatment of rebellious ores. Experienced men to operate the machinery necessary for properly treating base ores is also very essential. Mining, like other things, must be dealt with intelligently, and because one run upon a certain ore fails to pay it does not necessarily follow that another run will. Good management and favorable circumstances have much to do with the treatment of ores."

Coming as this does upon the heel of what has been herein shown, it furnishes not only important corroborative evidence of the correctness of the position we have taken upon this important subject, but the gratifying intelligence as well that mining men in new mining territories are alive to the true issue before them—that they are unwilling to pass through the long period of probation which California furnishes before learning and acknowledging the truth—the great, positive adamantine truth—that in gold-quartz mining the free-milling period is but the entrance to the caverns of nature's mineral wealth and is in no sense the key to the citadel. The bulk of all gold ores in California, as elsewhere, is what is commonly termed "low grade"; low grade in a general sense, because it does not contain free gold enough to be profitably worked by the stamp mill and amalgamating process, while, whatever it may hold in sulphuret formation counts for *nil.* This being the case, the problem is reduced to this simple proposition: Given a simple, rapid, cheap, and effective system of concentration, which will take these crushed and pulverized low-grade ores and extract the gold which they carry in whatever combination it may exist, and thereby transmute them into a high-grade material, valuable enough to bear transportation to the most available reduction or chlorination works, and the whole operation thereby becomes a highly profitable one at once; but the gold mining and gold getting becomes a simple matter—more certain in its results than agriculture or any other of the stable industries of the world; more certain than they, because in these great mineral storehouses of nature there is a harvest to be gathered that is neither mildewed by flood nor parched by drought; because, come what may of the pests and difficulties which the agriculturist has to encounter, and which makes his calling after all a precarious one, here in the everlasting hills there are stored illimitable treasures, which he may have who labors with one-half the care and systematic endeavor that the tiller of the soil displays, if he will but obey instead of defy the laws of nature. It is in this view of the possibilities of the future of gold mining in California, that the probabilities of that future may be predicted. It is in this view that the assertion is confidently made that that future is to outdo all that has been done in the past. Because as she certainly holds these enormous deposits in her rocky embrace, so in the enterprise, intelligence, and genius of her people exists a like certainty that a way will be found to unlock and obtain them.

The true system of transmutation or concentration of low-grade into high-grade ores, and the cheapest method of reducing them to bullion when obtained, may or may not yet have been found, but it is in that direction which the chief effort of practical thinking mining men is now being directed; and it is men of that class who will ere long solve the problem, if they have not done so already. It is not unlikely that one of the chief elements in the solution of the problem will be the disappearance of the cumbersome and wasteful stamp mill—which, in spite of its general use and the cheap theory that its advocates advance for it, is, and always has been, "a thief in disguise" in the mining world—and the substitution of methods that shall pulverize and prepare ore for concentration in such a manner as to make concentration practicable.

It is the day of successful concentration and reduction which California now awaits as the day of her emancipation from that long persistent mining folly that has long barred the way to true mining progress within her borders. It will come as certain as the tides ebb and flow, as certain as the future has in store for her what all the world concedes, that she is to take on the proportions of a great and opulent empire populated by a happy and prosperous people.

An eminent scientist and mining engineer, who has given much time and attention to the production of the precious metals for many years past, says:

"As every new banking institution is required to be the holder of gold proportionate to the credit paper issued, it stands to reason that, unless the supply of new gold be maintained, trade, commerce, and financial operations must be curtailed; which means general depression and a proportionate decrease in the value of all kinds of properties and labor. Civilized society having, during the past quarter century, been indulged in a sudden increase of wealth and prosperity by the production of gold, and tasted the pleasures and luxuries of life derived from the unparalleled increase of purchasing power, would not be content to forego, limit, or give up the acquired taste for new and pleasant luxuries, which it would have to do if the production of gold materially decreased. Gold mining must, therefore, be considered one of the most important industries of the world, and one to which there should be more intelligent consideration given than has heretofore been done."

A gentleman writing in the Contemporary Review for April, 1879, remarks as follows:

"It will not be questioned that the large increase of the world's money, due to the Australian and California gold discoveries, led to a great extension of the world's commerce. The interchange of commodities was marvelously stimulated; labor had for many years a greatly augmented recompense; the material comfort and welfare of mankind were greatly promoted; real and personal property increased enormously in value all over the civilized world; the foreign commerce of England alone rose from £250,000,000 in 1852 to £650,000,000 in 1875; the foreign commerce of many other nations rose in like proportions."

GLOSSARY OF MINING TERMS.

PREPARED BY DR. W. P. LAWVER.

A.

Adit.—A nearly horizontal drift or passage from the surface into a mine.

Adit Level.—A tunnel driven for effecting the general drainage of a mine, being designed to receive and carry off the water, both above and below its level.

Air Compartment.—A separate air-tight part of a rise, winze, shaft, or level for improving ventilation.

Air Jigging Machine.—For separating ores without water, by intermittent puffs.

Air Shaft.—A hole sunk for the special purpose of supplying air to the advancing end of a tunnel.

Alloy.—Two or more metals melted into one homogeneous mass.

Alluvial.—Deposits of mud, sand, gravel, &c., made by running streams, more especially the deposit left along their banks during high water.

Amalgam.—A compound of mercury with gold, silver, or other metals.

Amalgamation.—The process by which metals are separated from pulverized ore by mixing them with mercury.

Amygdaloid.—The name given to igneous and metamorphic rocks having almond-shaped substances distributed throughout them.

Anneal.—Heating metals, and then allowing them to cool slowly for the purpose of softening them.

Apex.—As defined by the Revised Statutes, "The end or edge of a vein on or nearest the surface."

Apron.—A canvas-covered frame set at such an angle in the miner's rocker that the gravel and water in pouring over it are carried to the head of the machine.

Arrastra.—A Mexican contrivance for crushing and amalgamating ores by means of a heavy stone dragged around upon a circular bed.

Arch.—A piece of ground left unworked near a shaft.

Argentiferous.—Anything containing silver.

Assay.—To determine the quantity of any particular metal or metals in bullion, mineral or ore, by chemical tests, or with the aid of heat; called the wet or humid when done by liquid tests and the dry way when done by fire.

Assay Ton.—A weight of 29,166⅔ grams. As one ton of 2,000 pounds avoirdupois contains 29,166⅔ Troy ounces, each milligram of gold or silver obtained from one assay ton of ore represents one Troy ounce to the ton of 2,000 pounds avoirdupois.

Assessment Work.—The work done annually on a mining claim to maintain a possessory or legal title.

Augustin Process.—The treatment of silver ores by chloridizing, roasting, lixiviation with hot brine, and precipitation with copper.

AURIFEROUS.—Containing gold.

ANTICLINAL.—The line of a crest above or underground, on the two sides of which the strata dip in opposite directions.

AZOIC.—The age of the rocks which were formed before any animals existed, or the era commenced with the origin of the earth's crust.

B.

BACK OF A LODE.—The portion of a lode lying between a level driven in a lode and the surface.

BALLARD.—Finely-separated lead ore.

BARREL AMALGAMATION.—The amalgamation of silver ores by placing the pulp, mixed with quicksilver, metallic iron, and water in barrels, and then slowly revolved.

BAR.—A band of hard stone or rock crossing a lode.

BASE METALS.—The metals not classed as valuable or precious.

BASIN.—A natural surface hollow where minerals may lie.

BATEAU.—A wooden bowl much used by Mexican miners for testing small quantities of auriferous sand or quartz by water concentration.

BATTERY.—A set of stamps in a stamp-mill comprising the number which fall in one mortar, generally five.

BATTERY AMALGAMATION.—Amalgamation by means of mercury placed in the stamp-mortar.

BATH.—A mass of molten material in a furnace or of solution in a tank.

BED.—A horizontal seam or vein of ore containing mineral.

BED-ROCK.—The strata lying immediately under loose or drifted matter.

BED VEIN.—A vein occupying the position of a bed that is parallel with the stratification of the inclosing rocks.

BLANKET SLUICES.—Sluices in which coarse blankets are laid to catch the fine but heavy particles of gold, amalgam, &c., in the slime passing over them.

BLENDE.—An ore of zinc consisting of zinc and sulphur.

BLIND LEVEL.—A level not connected with the other workings of the mine.

BLIND LODE OR VEIN.—Having no visible outcroppings, and only attained by digging.

BLOW OUT.—A large outcrop beneath which the vein is smaller, or runs out entirely.

BONANZA.—Name given to large deposits of rich ore.

BOTTOMS.—The deepest workings.

BREACH.—The face of the tunnel or drift.

BRECCIA.—Rock composed of angular fragments of rock cemented together.

BREAST.—The face of a working.

BUDDLE.—A long, slightly-descending box, used in the water concentration of ores.

BULLION.—Uncoined gold or silver. Fine bullion contains very little base material, and base bullion is usually pig lead containing little gold or silver.

BULKHEAD.—A partition in a mine for protection against fire, water, or gas.

BUTTON.—The globule of metal remaining in an assay cupel or crucible at the end of a fusion.

C.

CAGE.—A box or platform used for hoisting in a vertical shaft.

CALC-SPAR.—A pure crystallized carbonate of lime sometimes found as a matrix in veins.

CANN.—A very fine and soap-like white clay found upon the joints and within the seams of lodes. A good indication for minerals.

CAÑON.—A deep, narrow valley.

CAP.—A vein is in a "cap" when it is much contracted.

CAP-ROCK.—The uncertain upper rock that covers the older bed-rock.

CARAT.—A term used to distinguish the fineness of a gold alloy and meaning one-twenty-fourth pure gold, being 24 carats fine.

CARBONATE.—Carbonic acid, combined with a base; soft carbonates have lead and hard carbonates iron for a base.

CATCH-PIT.—A reservoir for saving the tailings from reduction works.

COUNTER-LODE.—A smaller vein or lode running diagonally across the main lode.

CAVED.—When the rock or walls of a level or tunnel have fallen in or crushed together.

CEMENT.—Indurated, gold-bearing gravel, hardened and held together chiefly by a siliceous mixture.

CHEEKS.—The sides or walls of a vein.

CHIMNEYS.—The richer spots in lodes, as distinguished from poorer ones.

CHILIAN MILL.—An improved arrastra, in which a heavy stone-wheel is rolled around the circular bed.

CHLORIDE.—Chlorine chemically united with a base; a common term for ores containing chloride of silver.

CHLORIDIZE.—To cause chlorine to unite with a base; applied to the roasting of silver ores with salt, preparatory to amalgamation, and the chlorinizing of gold by cold chlorine water.

CHOKE-DAMP.—Carbonic acid gas.

CINNABAR.—The sulphide of mercury.

CLAIM.—The portion of mining ground held under the Federal or local laws by one person or association.

CLEAN-UP.—The operation of collecting all the gold and silver during a single run or given period in a stamp mill, or in a placer or hydraulic mine.

CLEAVAGE.—The planes at which cleavable stones break; the degrees of cleavage ore, perfect or imperfect, easy or difficult.

COPPER PLATES.—Plates of copper covered with quicksilver, over which the pulp from the batteries is allowed to flow, the gold being taken up by the mercury.

CONCENTRATION.—The removal of the lighter and less valuable parts of the ore by mechanical means. The concentrations are the richest part of the ore thus obtained.

CONCENTRATOR.—The machine with which, through the aid of air, water, magnets, or specific gravity, concentration is effected.

CONTACT LODE.—A vein lying between two differently constituted rocks, as granite and slate.

COUNTRY ROCK.—The rock masses traversed by a vein or ore deposit.

COURSE.—The direction taken by the vein.

CRADLE.—See *Rocker.*

CRIBBING.—The timber or plank lining of a shaft; the supporting or confining of the wall rock.

CROSS-CUT.—A drift or level driven at right angles to the course of the vein.

CROSS-COURSE.—A vein lying across the veins of a district.

CROPPINGS.—Portions of a vein seen exposed above ground.

CREVICE —A narrow opening resulting from a split or fissure.

CRUSHING.—Pulverizing the ore with stamps or pulverizing machinery.

CUT.—To intersect a vein; open cut, a level without a covering driven across the course of a vein.

CUPELLATION.—The treatment on a hearth or cupel (usually made of bone ash) of an alloy of gold, silver, and lead, by means of fusion and an air blast, which oxidizes the lead to litharge and removes it in a liquid form or absorbs it in the cupel.

D.

DAMP—BAD AIR.—Choke damp; fire damp.

DÉBRIS.—Fragments detached from rocks or from any kind of disintegration.

DECOMPOSED.—That which has undergone some chemical change, natural or artificial; as the desulphurization and oxidation of the sulphuret of iron.

DESCENSION THEORY.—The theory that the mineral in veins entered from above.

DEADS.—Earthy material without ore; the waste rock packed in excavations from which ore has been removed.

DEAD-WORK.—Not productive, but necessary for exploration and future production.

DEPOSIT.—Mineral deposit, or ore deposit, is used to designate the natural occurrence of mineral or ore sufficiently rich to warrant its being worked.

DIGGINS.—Name applied to placer mines.

DIP.—The slope or inclination of a vein or bed from a horizontal line.

DISCOVERY.—The first finding of a mineral deposit (before location) upon a mining claim.

DITCH.—An artificial water course, flume or canal, to convey water for mining.

DIE.—A piece of hard iron placed in a battery to receive the blow of the stamps.

DOWNCAST.—The opening through which the ventilating air current descends into a mine.

DRIFT.—A tunnel driven through the rock from one point of a mine to another.

DRIVE.—To extend an excavation horizontally.

DRY AMALGAMATION.—Treating ores with hot and dry mercury, instead of mercury and water.

DUMP.—The pile of ore or waste rock taken from a shaft or tunnel.

E.

ELIQUATION.—Separating an alloy by heating it so as to melt only the more fusible of its ingredients.

ELVAN.—A band or course of hard claystone or porphyritic rock.

Epidote.—A mixture of alumina and silica forming a variety of granite; often of beautiful color and shape.

Eruptive.—The name given to rocks that have burst through other rocks in a molten state, or that have been thrust up bodily.

Explosives.—The explosives used in mining are, gunpowder, nitroglycerine, dynamite, &c.

Exploitation.—The productive working of a mine, as distinguished from exploration.

Eye.—The top of a shaft or pit.

F.

Face.—The end of a tunnel or stope where work is going on or was last done.

Fault.—A discoloration or cut-off of the strata or the rim.

Feeder.—A small vein joining a large one at nearly right angles.

Fire-Damp.—Light carbonated hydrogen gas, and which when present in common air to the extent of about one-fifteenth by volume, the mixture is explosive.

Fissure Vein.—A fissure or crack in the earth's crust filled with mineral.

Float Gold.—Particles of gold so small and thin that they are liable to be carried off by the water.

Float Ore.—Water-worn particles of ore, fragments of vein matter found on the surface below and often some distance from the vein of which it originally formed a part.

Floor.—The rock underlying a stratified or nearly horizontal deposit.

Flouring.—The covering, in the course of using, of the globules of mercury used in gold extraction with a thin film of the sulphide of some other metal by which the power to intercept gold is lost; sometimes called sickening.

Flume.—An artificial water-course.

Flux.—Any substance that is favorable to fusion, oxidation, or reduction by fire.

Foot Wall.—The upper surface of the rock that lies under the lode or vein; also called the lower or underlying wall.

Free Gold or Silver.—Native, uncombined with other substances.

Free-Milling Ore.—Ores in which the precious metals are free from combination with other substances and can be reduced by crushing and amalgamation without roasting or chemical treatment.

G.

Galena.—Sulphide of lead, the ordinary lead of commerce.

Gallery.—A level or drift.

Gangue.—The mineral associated with the ore in a vein.

Gangway.—A roadway through the deads or rubbish in a mine.

Geological Formations.—Groups of rocks of similar character and age.

Giant.—A hydraulic nozzle.

Giraffe.—A car of peculiar construction made to run on an inclined plane.

Glance.—Sometimes applied to glancing or shining materials; as copper glance, lead glance, &c.

Gouge.—A layer of soft material along the wall of a vein.

GRASS.—The surface over a mine.

GRIZZLY.—A grating to catch and throw out large stones from sluices.

GROUND-SLUICE.—A long box with suitable chinks for retaining the gold, used by gravel miners for washing away large quantities of auriferous débris.

GULCH.—A deep narrow ravine.

H.

HANGING WALL.—The upper side of a lode or wall over the vein.

HEADING.—The under side of a lode or vein above a drift.

HEAVE.—A horizontal dislocation of a vein or stratum.

HENDERSON'S PROCESS.—The treatment of sulphide of copper ores by roasting with salt, to form chlorides, which are then leached out and precipitated.

HORN SILVER.—The common name for chloride of silver, so called because it has a horn-like surface.

HORSE.—The dead or barren rock or ground by which a vein is sometimes split horizontally into two.

HUNGRY.—Hard, barren vein matter like quartz.

HURDLED ORE.—Ore passed through a coarse screen or sieve.

HYDRAULIC HORSE.—The flexible pipe or tube used to direct a stream of water against gold-bearing gravel or face of a drift.

HYDRAULICKING.—Tearing down and washing gold-bearing gravel with water discharged upon it from iron pipes and under great pressure.

I.

IMPREGNATION.—An ore deposit consisting of the country rock impregnated with ore.

INCLINE.—A shaft, not vertical, usually on the dip of the vein.

INCLINATION.—The dip of the vein from the horizontal line.

INFILTRATION THEORY.—The theory that a vein was filled by the infiltration of mineral solutions.

INGOT.—A cast bar or block of metal.

INJECTION THEORY.—The theory that a vein was filled first with molten mineral.

IN PLACE.—An ore deposit occupying the place in which it was originally found.

J.

JIGGING.—Separating ores according to specific gravity, with a coarse sieve agitated up and down in water.

JUMP.—To take clandestine possession of another's mining claim.

JUNCTION.—The union of two veins or lodes.

K.

KIBBLE.—An iron bucket used for raising ore out of a mine.

KILLOS.—The hard shale or slate traversed by veins.

L.

LAGGING.—Planks placed over the caps or behind the posts of timbering to prevent the earth or fragments of rock falling through into the shaft or tunnel.

LEACHING OR LIXIVIATION.—The extraction of metal salts from ores by means of a watery solvent, after certain changes produced by roasting, &c.

LEADER.—A small vein leading to a larger one.

LEVEL.—A horizontal passage or drift into or in a mine.

LITTLE GIANT.—A jointed iron nozzle used in hydraulic mining.

LODE, LEDGE, OR VEIN.—A fissure in the country rock filled with mineral.

M.

MATRIX.—The rock or earthy material containing a mineral or metallic ore.

MATTE.—The product of the first incomplete reduction of an ore.

MILL.—Works for reducing ores by other means than smelting.

MILL RUN.—The work done by a mill between two clean-ups. A test of a given quantity of ore by actual treatment in a mill.

MINER'S INCH OF WATER.—Usually applied to the amount of water that will escape from an aperture one inch square through a two-inch plank, with a steady flow of water standing 6 inches above the top of the escape aperture, the quantity so discharged amounting to 2,274 cubic feet in twenty-four hours.

MORTAR.—A deep iron dish in which ore is pulverized for assaying. In stamp mills the iron trough containing the dies on which the stamps fall and crush the ore.

MOTHER LODE.—The principal vein running through a particular section of country.

MUFFLE.—A semi-cylindrical or long-arched oven, heated from outside, in which substances may be exposed at a high temperature to an oxidizing atmospheric current. Cupellation and scorification assays are made in muffles.

MULLER.—The iron shoes dragged around in an amalgamating pan to mix and further pulverize the pulp.

N.

NATIVE METAL.—When found in a pure or natural metallic state, as native gold or copper.

NOBLE METALS.—Metals having so little affinity for oxygen that they do not readily become rusty, such as gold, silver, mercury, and platinum.

NODULAR.—Having a blistered appearance or kidney shape.

O.

OPEN-CUT.—A surface working, open to daylight.

OPEN-WORK.—A quarry, or open cut.

ORE.—The parts of a vein containing a useful or salable metal.

OUTCROP.—That portion of a vein appearing at the surface.

OUTPUT.—The product of a mine.

OVERLAPPING.—When a group of strata passes over one or more intermediate groups and finally rests upon one much older, it is said to overlap.

P.

PALEOZOIC.—The name applied to the strata containing the remains of the earliest organic beings.

PANNING.—Washing gold-bearing gravel in an iron pan, made for the purpose, to obtain the gold it contains.

PARTING.—The separation of two metals in an alloy, especially the separation of gold and silver by means of nitric or sulphuric acid.

PATCH.—A small placer claim.

PAY STREAK.—In placer mining, a rich strip of gold-bearing gravel.

PILLAR.—A mass of ore left to support the roof or hanging wall in a mine.

PINCH.—A vein pinches when it contracts in width.

PIPING.—In hydraulic mining, discharging water from the nozzle of a pipe on the gold-bearing gravel.

PITCH.—The inclination of a vein.

PLACER.—A gravelly soil containing gold or the precious metals which are obtained by washing such ground with water.

POCKET.—A small body of rich ore in a vein.

PORPHYRY.—Porphyry, purple; the name originally given to a red rock with small white crystals of feldspar disseminated in it, derived from Egypt, and now used somewhat vaguely to denote rocks containing feldspar, more especially the reddish varieties.

PROSPECTING.—Searching for undiscovered deposits of ore; also preliminary explorations to test the value of veins or placers.

PUDDLING MACHINE.—A machine used for mixing gold-bearing clays with water to the proper consistency for the separation of the ore.

PULP.—Pulverized ore.

PULVERIZER.—A machine for grinding ores fine instead of stamping them.

Q.

QUARTATION.—The separation of gold from silver by dissolving out the latter with nitric acid; the alloy must be at least three-fourths silver. It is also applied to the alloying of gold with silver, if necessary to prepare it for this method of parting.

QUARTZ.—Crystalline silica—any hard gold or silver ore as distinguished from earth or gravel.

R.

REDUCE.—To deprive of oxygen; to heat metallurgically for the production of metals.

REFINING.—Purifying crude metallic products.

REFRACTORY.—Resisting the action of heat and chemical agents.

RETORTING.—Removing the mercury from an amalgam by volatilizing it in an iron retort, conducting it away through a tube connected with the retort, and condensing it.

REVERBERATORY FURNACE.—A furnace in which ores are submitted to the action of flame without contact with the fuel. The flame from the side or end passes upward over a low wall, strikes the roof (arch) of the furnace, and is reverberated downward upon the charge.

RIDDLE.—A sieve; the riddlings remain on the sieve or riddle and the fell goes through.

RIFFLE.—A groove in the bottom of a sluice to hold the quicksilver and catch the free gold.

RIM-ROCK.—The bed-rock rising to form the boundary of a placer or gravel deposit.

RISE.—A shaft or winze excavated upwards.

ROOF.—The rock overhanging a bed or vein.

Roasting.—Ores submitted to the action of flame until sulphurous and arsenious fumes cease to be given off.

Rocker.—A long sluice-like box for washing away gravel from gold by cradle-like rocking.

Rock-breaker.—A machine, of which Blake's crusher is the type, in which the rock is crushed between two jaws, to prepare the ore for further crushing in the stamp mill.

Rock-drill.—A machine for boring in rock.

Rocking.—The process of separating ores by washing on an incline plane.

Rolls.—Cylinders of iron or steel revolving towards each other, between which rock is made to pass in order to crush it; also applied to plain rolls, through which assay slips or gold and silver ingots are passed.

Run.—The length of time reduction works or hydraulic mines are kept in operation without stopping to clean up or make repairs.

Rusty Gold.—Free gold, which does not readily amalgamate, the particles being covered with a film of oxide of iron.

S.

Safety Cage.—A platform used for lowering and hoisting miners into and out of mines, which is provided with a safety catch for preventing the fall of the platform if the supporting cable breaks.

Safety Lamp.—A lamp the flame of which is so protected by wire-gauze that it will not readily ignite fire-damp.

Salting.—Fraudulently enriching a sample or vein by adding to or placing therein richer ore than nature placed there.

Sample.—An average portion of ore taken from across a vein, by which the quality, quantity, and value may be ascertained.

Scorification.—A process employed in assaying gold and silver ores, and performed in a shallow clay vessel (scorifier) in which ore, lead, and borax-glass are exposed to heat and oxidation in a muffle.

Screen.—A sieve of wire cloth or perforated sheet iron used to sort ore according to size.

Seam.—A thin stratum of ore.

Sedimentary.—Rocks formed by the deposition of sand, mud, clay, &c., in water.

Segregation.—A mineral deposit formed by concentration from adjacent rocks.

Shaft.—A pit or well-like excavation sunk from the surface.

Shift.—The length of time a miner works in one day or night; the day or night shift.

Shoe.—A piece of iron fastened to the bottom of a stamp, and which can be replaced when worn out.

Sickening.—Flouring.

Side Adits.—A passage sometimes made when the chief passage is choked with rubbish.

Sink.—To work downwards.

Slag.—The melted gangue from furnace smelting and assaying of ores.

Slide.—A minor fault or disturbance in a vein.

Sluicing.—Washing auriferous earth through long troughs with loose riffled bottoms for the purpose of catching gold.

Slums.—The discharges or washings from hydraulic mines.

SMELTING.—Reducing by fusion, in furnaces, to metals.

SPUR.—A branch leaving a vein, but not returning to it.

STAMP-MILL.—A mill where ores are crushed by stamps to the desired fineness.

STANDARD.—The United States Government standard for gold and silver coins, as expressed in thousandths, is 900 thousandths or 900 parts in a thousand of gold, for gold coins, and 900 parts of silver in a thousand for silver coins.

STOPING.—Excavating ore from a vein by driving horizontally upon it a series of workings, one immediately over or under the other.

STRATUM.—A bed or layer.

SUBLIMATION.—The volatilization and condensation of a solid substance, without fusion.

SUBLIMATION THEORY.—The theory that a vein was filled first with metallic vapors.

SUMP.—A pit sunk from the bottom of the mine, either to probe a ledge or collect water.

SURFACE DEPOSITS.—Those which are exposed and can be mined from the top.

SWEEPS.—The dust of the workshops of assayers and refiners in gold and silver, jewelers, goldsmiths, and silversmiths.

T.

TAILINGS.—The refuse matter discharged from hydraulic mines intermixed with water which carries them off, or what passes away from reduction works after any systematic treatment.

TAIL RACE.—The channel by which the tailings suspended in water are carried away from a mill or mine working.

THROW.—The dislocation of a vein or strata which has been thrown up or down by the movement of the earth.

TRACE.—To follow the vein on the surface, to lay it open by a long pit.

TRIBUTORS.—Miners who receive for their labor a certain portion of the ore they take out, or its proceeds.

TUNNEL.—A level, driven at right angles to the vein which it is desired to reach.

U.

UNDERLIE.—The departure of a vein or stratum from the vertical.

UNWATER.—To remove the water from a mine.

UPCAST.—The opening through which the ventilating current passes out of a mine.

UPHEAVED.—When a seam or vein has been broken and one part shifted upwards.

V.

VANNING.—Washing ore on a shovel, similar to panning.

VAPOR.—Foul air in a mine.

VEIN.—See *Lode*.

VEINOUS.—Rock or matter from the vein, and not "bed-rock" or "country."

VEGETATE.—Crystallize; exude.

VITREOUS.—Glass-like; as the slag; ore sufficiently vitreous for good results.

W.

WALL.—The country rock bounding a vein laterally.

WASH-DIRT.—The name given to the beds of drift in which the gold is usually found.

WATER-COURSE.—An artificial channel for passage of water.

WATER-LEVEL.—The level at which by natural or artificial drainage water is removed from a mine.

WHIM.—A machine for raising ores and refuse matter by means of a vertical drum revolved by horse or steam power.

WINZE.—A small shaft sunk from one level to another.

WORKINGS.—The various underground excavations of a mine.

WORKING BIG.—When the vein in working admits of a space 2½ feet wide, so that the miner need not break down any of the adjacent rock.

WORKING HOME.—Working toward the main shaft in extracting ore.

WORKING OUT.—Working away from the main shaft in excavating ore.

Y.

YIELD.—The quantity obtained of the mineral or metal sought.

Z.

ZONE.—Name given to a belt or band of strata and to groups of strata distinguished by similarity of organic remains or mineral characteristics.

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